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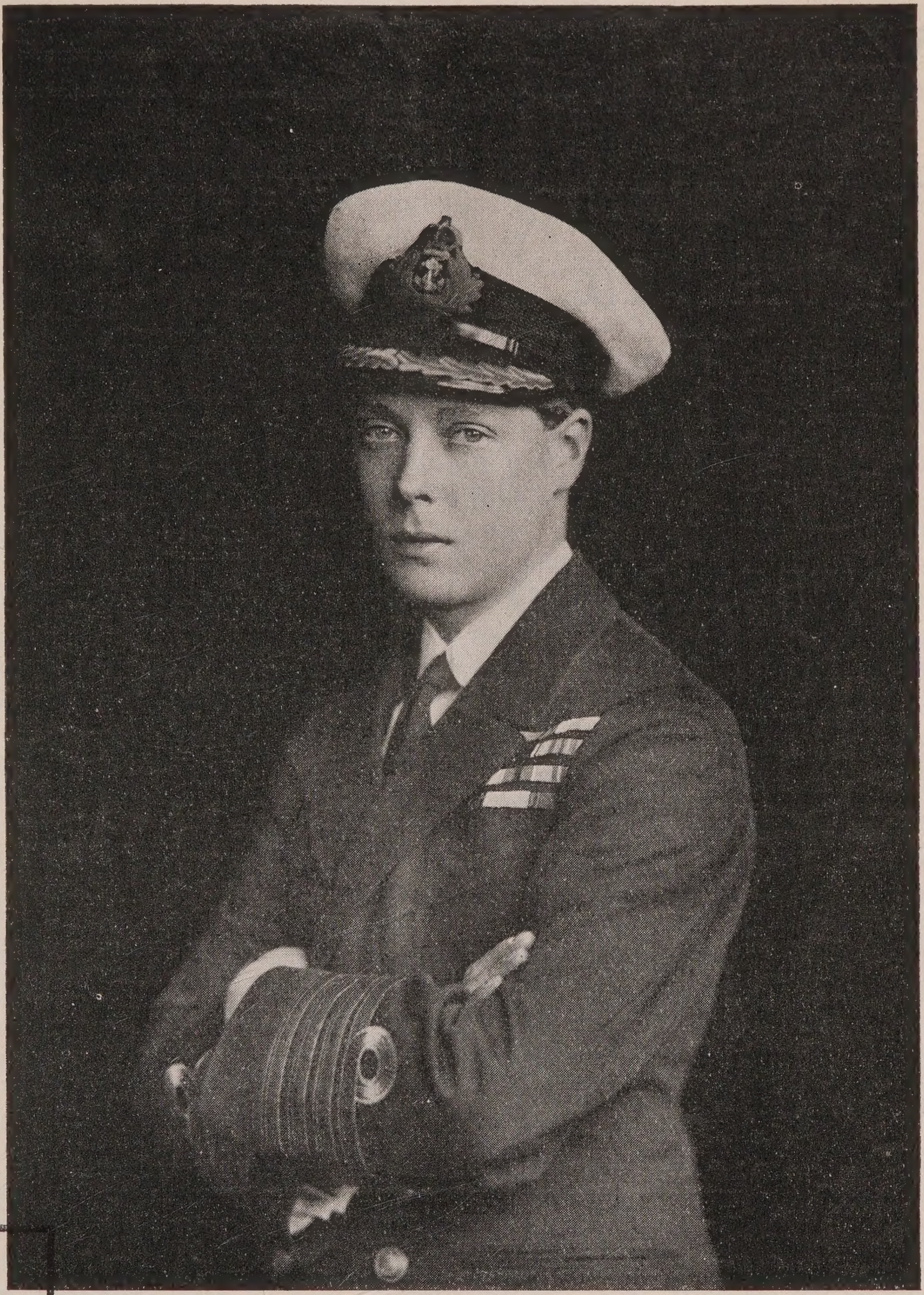

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President (1923)
:: of the ::
Central Council of Milk Recording Societies
:: to which ::
The Kent Milk Recording Society is affiliated.

His Royal Highness takes the greatest interest in the efforts which are being made in the County of Kent in regard to the production of Clean Milk.

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GARLIC
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INFECTIOUS
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LIVE STOCK.

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Monkton Court,
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May 26th, 1923.

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Owing to great demand no free samples can be sent.

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Veterinary Department,
CLEMENT & JOHNSON, Limited,
Research Medical Chemists
19, SICILIAN AVENUE, LONDON, W.C.1.

FOREWORD.

By ALFRED GREENWOOD, M.D., B.Sc., D.P.H., Barrister-at-law, Medical Officer of Health for the County of Kent.

It is a pleasure and a privilege to write a foreword for the handbook connected with the first clean milk competition which has been held in the County of Kent. Sincere congratulations are due to all those who have been responsible for the preparation of rules, methods to be followed in sampling, recording results, etc., and it is hoped that this competition will be the forerunner of many others, not only in Kent, but in other parts of England.

The Kent Milk Recording Society have performed a most valuable service in deciding to publish a full report on the competition, and it is to be trusted that the 20,000 copies of this handbook, printed and distributed broadcast, will be read widely, and will stimulate a greater interest in this important matter amongst dairy farmers and the public generally.

Probably a greater section of the public are now alive to the need for a cleaner, raw milk supply than was the case several years ago, but unless care be taken, misapprehensions, as to the best methods to be adopted, may arise.

All will agree, in the first place, that as a rule, the best food which an infant can have is its mother's milk; but for various reasons, industrial and otherwise, artificial feeding by cows' milk must be adopted frequently. Cows' milk is therefore often an essential element in the feeding of infants, young children and invalids. In a general diet, *clean raw* milk is not only a perfect food, but it is by far the best form of milk, if it can be obtained, and every effort should be encouraged to induce an increased consumption of such food, not only from a health but from an economic point of view.

It is well known that the opportunities for the contamination of milk may increase at each stage of its journey from the cow to the consumer. One need only mention the soiled udders, the milkers' hands, the milk pail, the mixing vessels, the hands again, the carts, the shop, etc., for this point to be emphasised.

A clean milk supply, at its source, is therefore of high importance, and it has been proved that the greater the cleanliness of the cow, the milker, the vessels, and the lower the temperature of the milk, the fewer are the bacteria present at the source of supply.

Any steps which might lead to a diminution in consumption of raw untreated milk would be regrettable from every point of view.

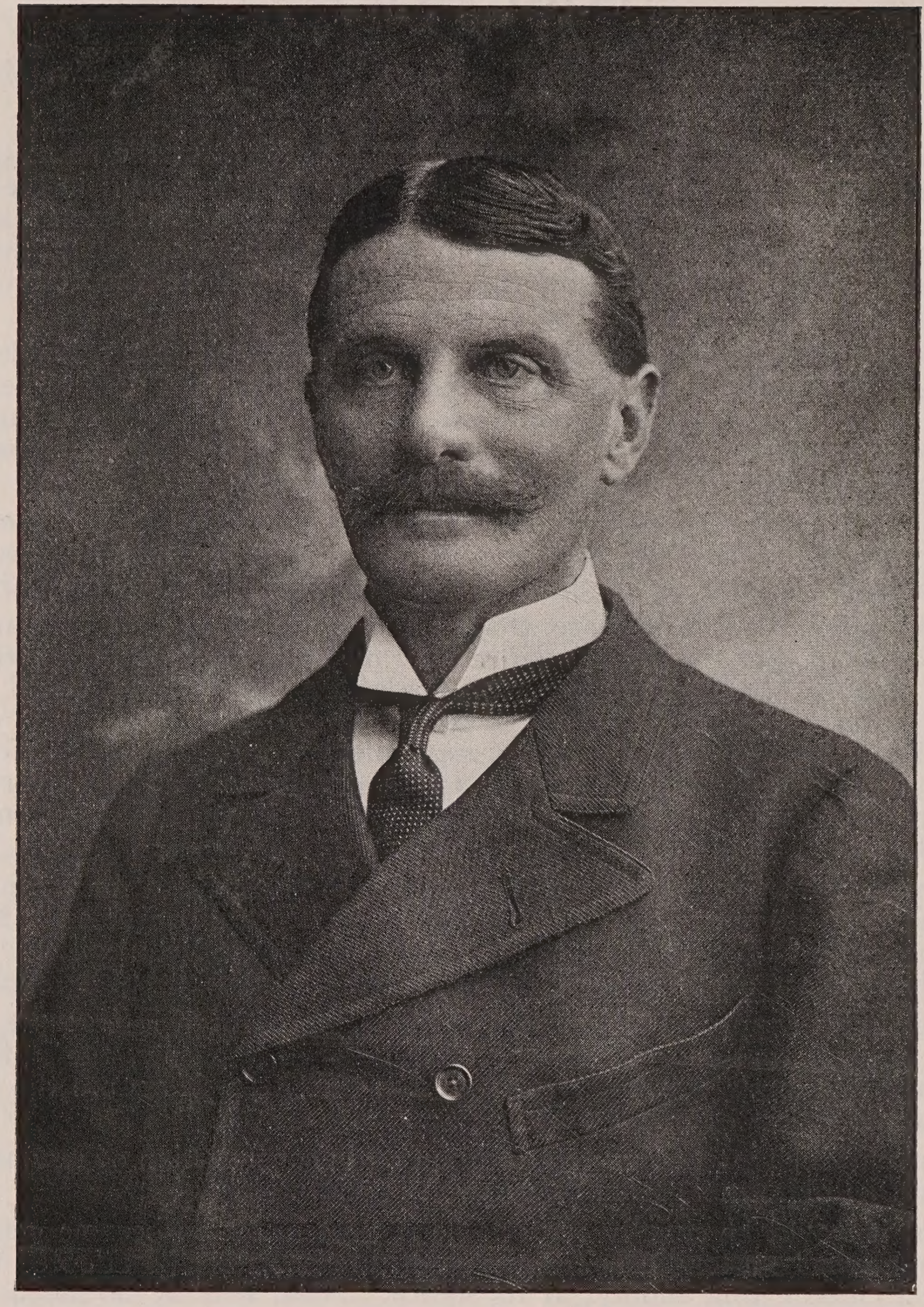
Again, it would be equally regrettable if pasteurisation became general, as then there might be a tendency for less careful measures to be adopted in order to obtain a cleaner milk supply, at its source. Also, it is by no means certain that pasteurisation does not cause changes in milk, which may lessen its nutritive value, such as by the destruction of vitamins, or by the reduction of the lime contents so necessary for the building up of the bone structure in infants and in young children.

I would therefore plead with all the force of language at my command for, firstly, universal help and encouragement in the increased production of a cleaner raw milk supply at a reasonable cost; secondly, an increased consumption of such milk by a re-assured public; and thirdly, a continuance and extension of such competitions as are referred to in the following pages.

If such objects can be obtained, and I feel sure that they can be, a great step forward will have been taken towards the future success of the dairy industry, and in an improvement of the general public health of the community.

ALFRED GREENWOOD.

CLEAN MILK IN KENT.



Col. F. S. W. Cornwallis, C.B.E., T.D., D.L., J.P.
(Chairman of the Kent County Council.)

I am fully of the opinion that a cleaner milk supply would be of great benefit to the Nation; it is hardly possible to over-state the importance of clean and wholesome milk so far as infant life is concerned. As milk is the sole food of the small infant, it must be apparent to everyone that the purity of milk should be unquestionable.

But apart from the feeding of children, a sufficient and pure milk supply is also of vital importance to adults, and the general health of the Nation could not fail to improve if more milk produced under perfect conditions were consumed.

F. S. W. Cornwallis

The Eagle, Star & British Dominions Insurance Company, Ltd., is the most progressive Office for all Classes of Insurance and Assurance. It specializes in the Insurance of Live Stock and thé requirements of Farmers.

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Captain Hatfeild, Hartsdown Farm, Margate.

FUTURE ARRANGEMENTS IN REGARD TO CLEAN MILK TESTS AND THE NEXT COMPETITION.

The members of the Kent Milk Recording Society now have the advantage of being able to Secure examinations of milk for Bacteriological Content and Butter Fat by the County Pathologist and County Analyst respectively, at any time upon application to

THE SECRETARY,
22, High Street,
Maidstone.

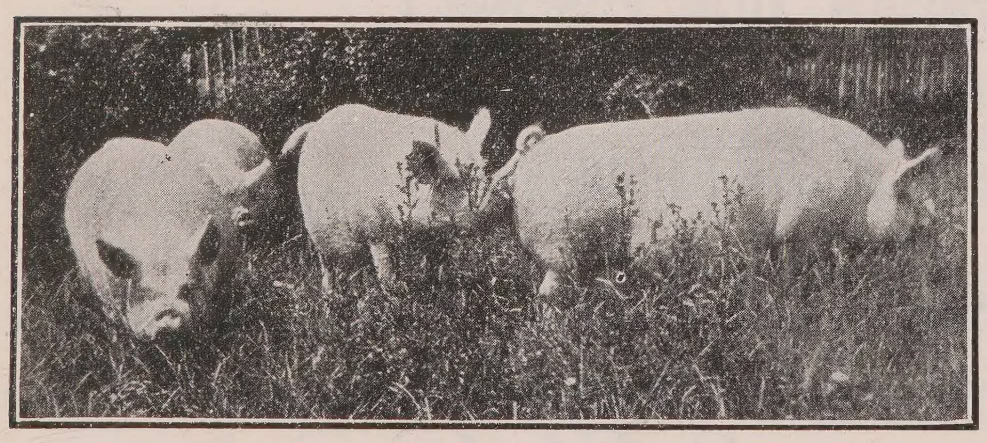
By this means they can satisfy themselves and their men that they are producing high-grade milk.

This service is an added reason why " All Dairy Farmers in Kent should join The Kent Milk Recording Society."

The coming Clean Milk Competition will be open to all Dairy Farmers (whether they are members of The Kent Milk Recording Society or not), but it is IMPORTANT to take notice that we may have to Limit the number of Entries for the next Competition.

The only fair way to deal with the matter, therefore, is to accept entries in Rotation.

A preliminary Entry Form will be found at the end of this Handbook, and if any Dairy Farmer is desirous of taking part in this Competition, he should complete same at an early date.



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MINISTRY OF AGRICULTURE & FISHERIES,
10, WHITEHALL PLACE, S.W.1.

15th June, 1923.

DEAR SIR,

I understand that the Kent Recording Society was responsible, in conjunction with the Kent Education Committee, for organising a very successful Clean Milk Competition, which was recently held in the County, and I should like to send you an expression of my heartiest congratulations on your effort. The importance of securing to the public a pure milk supply is gradually becoming recognised by the farming community, and the response to the efforts which are being made to awaken in farmers an interest in improved methods is becoming more and more encouraging. The Ministry is working to secure this end, but it has to rely very largely on local effort and example in order to reach effectively those large numbers of the farming community who are seldom reached by the action of a Central Department. For this work, Milk Recording Societies are capable of, and are in fact doing splendid service, and I am glad to have this opportunity of acknowledging the work of the Kent Milk Recording Society which is well-known and appreciated at the Ministry, and for whose further success I send my best wishes.

Yours truly,
(Signed) R. A. SANDERS.

The Secretary,
Kent Milk Recording Society.

Message from Sir A. Daniel Hall, K.C.B., LL.D., F.R.S.

I am glad to congratulate the Agricultural Education Sub-Committee of Kent on the great measure of success which has attended their first Clean Milk Competition

Next to the Milk Recording Society, which is the basis of all successful milk production, there is nothing that can do more for the dairy industry than the clean-milk movement. The public have to be given confidence in the milk supply, which has been subject to certain aspersions, undeserved for the most part, but occasionally too palpably supported by the dirt that can be traced in the milk. In the interests of health children should have plenty of milk, and, above all, fresh milk. Condensed milks and dried milks have their value as foods, but they cannot do for children what fresh milk will, provided the fresh milk is clean and does not introduce any danger of disease. That such pure milk is available for the public a competition of this kind plainly demonstrates. Again, the public is neither buying or consuming as much milk as it might considering its cheapness as a food. This is very largely due to the uncertainty felt by the small housekeeper whether the milk will keep. The cleaner the milk the less the risk of souring, so that a general increase in the quality of the milk supply will be followed by its greater consumption, to the benefit of both the consuming public and the producer. Lastly, a clean-milk competition serves to demonstrate to the dairy farmer that the sort of improvement desiderated in the milk supply can be attained at no great cost, demanding as it does neither expensive buildings nor special conditions, but only the sort of care and attention which can be reasonably given when those concerned have been awakened to the results that follow. I hope, therefore, that the movement so successfully initiated this year may grow and extend.

(Signed) A. D. HALL.

To Dairy Farmers

At **Monkton Court**
RAMSGATE
on Friday, October 5th, 1923

Under the Auspices of the Kent Milk Recording Society

HARRY JAS. BURT

will hold his

Second Annual Sale

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60 Head

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Mainly Second & Third Calvers,
Officially Milk Recorded
Non-Pedigree (Several Foundation)
Dairy Shorthorn & British Friesian

Dairy Cows

All Bred by

J. W. SMITH AND SON

Monkton Court, Ramsgate

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Kent Milk Recording Society

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Feed Your Cows on Loder's Coconut Cake

And increase the Quality and Quantity of your Milk.

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Gained the Diploma and Second Prize in the Kent Clean Milk Competition of 1923.

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CLEAN MILK should be obtained direct from the producer to ensure that it reaches the purchaser in the same condition and in the same container as that in which it leaves the farm.

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THE
FIRST KENT CLEAN MILK COMPETITION.

By G. H. Garrad, N.D.A., Agricultural Organiser.

1. Its Objects.

This Competition originated in the first place from an enquiry received, during the summer of 1922, from a coast-town dairy farmer supplying milk to several girls' schools at Broadstairs and Ramsgate. The Head Mistresses of these schools had been reading articles in a certain Daily Paper condemning fresh cows' milk on account of the filth and number of dangerous germs it was alleged to contain and, being alarmed by what they read, they asked the farmer supplying their school with milk for some guarantee that his milk was reasonably clean. The farmer brought his difficulty to the writer, as Agricultural Organiser of the County, and it was possible to make arrangements for samples of his milk to be taken by the Sanitary Inspector and submitted to the County Bacteriologist at Maidstone for a bacteriological examination.

It was soon evident that other farmers were confronted with a similar difficulty, and that the consumption of fresh milk was being restricted by the fact that the public was afraid of it.

It is universally recognised that the consumption of fresh (untreated) milk in this country is not nearly so large as it should be, and that it is in the interests of all concerned that a greater consumption of reasonably clean milk should be encouraged. The National Farmers' Union are organising a campaign to advertise the food value of milk, but it is important that farmers should be in a position to show that their milk is not only a cheap food but that it is also a safe food, produced under hygienic conditions so that nobody need be afraid of drinking it.

The Agricultural Education Sub-Committee of the Kent Education Committee decided, therefore, to organise a Clean Milk Competition for four purposes:—

(a) To show that there is already available a supply of clean milk in the county, in addition to what is sold as Grade A and Certified milk.

(b) To assist those dairy farmers in the county already interested in, and anxious to produce, clean milk, by examining their milk from time to time, by visiting their cowsheds, and, as a result of the examinations and visits, by advising them how their methods could be improved.

(c) By friendly rivalry to stimulate those dairy farmers who entered this Competition, and especially their milkers, to learn the essential conditions necessary for the production of clean milk and to encourage them to pay still closer attention to the conditions under which their milk is produced and handled.

(d) To demonstrate to dairy farmers in general how reasonably clean milk can be produced in ordinary farm buildings, and under ordinary farm conditions, without excessive increase of cost, so that a larger supply of such milk may be available for the public.

There is no greater enemy of the dairy farmer and his business than the cow-keeper who is producing dirty milk and giving a bad reputation not only to his own but to everybody else's milk. Such cow-keepers are not so numerous as some of the newspapers have led the public to believe, but unfortunately some do still exist. Such a man is largely responsible for frightening many housewives into the belief that fresh milk is full of dangerous germs, causing them to give up the consumption of fresh milk in favour of tinned condensed milks, dried milks, or no milk at all. The sooner these men are stopped from continuing their bad practices, the better it will be for the fresh-milk industry. It is not sufficient for the dairy farmer to produce milk; he must also be able to sell it. In order to sell it he must produce what the public wants, and the public has stated very definitely that it wants reasonably clean milk at a reasonable price. If the farmers can re-assure the public that their milk is reasonably clean, that they need have no fear in drinking it, that if properly looked after in the home it will keep fresh a reasonable length of time, and that the price is reasonable, the consumption will undoubtedly increase enormously, and there is every reason to believe that all danger of supply exceeding demand will vanish.

From the farmer's own point of view the fact that cleaner milk will lead to a greater consumption must surely be a stimulus to him, whilst a reflection on the number of gallons of milk that have been returned to him sour and unsaleable, which might have been entirely avoided by a little more attention to details of cleanliness, will still further rouse his desire to look into this matter. Those who are not prepared to go into this question unless they are first guaranteed a higher price for cleaner milk are surely taking a short-sighted view. In business a manufacturer produces a good article and then pushes it and sells it for what it is worth—he does not wait until somebody asks for it before he begins to make it. As a matter of fact, there is a growing demand for cleaner milk, as is reflected by the Milk and Dairies (Amendment) Act, under which Local Authorities are now empowered to refuse to register any milk retailer if they are satisfied that such action is necessary in the interests of public health. When the Milk and Dairies (Consolidation) Act comes into force in 1925 those farmers who produce dirty milk will be in a very unenviable position.

MILK

Which do you want?

THE USUAL KIND OF MILK OR

FRESH, PURE MILK

: STRAIGHT FROM THE FARM :

If you want the Real thing—the Pure Unadulterated Milk, Clean and Fresh

Delivered From

THE FARM TO YOUR DOOR

Twice Daily

GIVE A TRIAL TO:

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45, WROTHAM RD., & 24, PELHAM RD., South,
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And at DOVER ROAD, NORTHFLEET.

Purveyors of PURE NEW MILK, CREAM,
& HIGH-CLASS DAIRY PRODUCE.

NO CONNECTION WITH ANY COMPANY OR COMBINE.

2. Its Initiation.

In order that the Competition should be successful it was essential that there should be a large number of competitors. As most of the leading dairy farmers in Kent are members of the Kent Milk Recording Society, the Kent Education Committee decided to solicit the influential support of the Milk Recording Society in running the competition. A special meeting of the Executive Committee of the Kent Milk Recording Society was held at Maidstone on November 30th, 1922, when the case, as set out above, was laid before the Committee by the writer, Mr. R. M. Wilson (the Principal of Wye College) and Dr. C. W. Ponder (the Kent County Pathologist). The Executive Committee of the Milk Recording Society unanimously passed a resolution in favour of the proposal to hold a Clean Milk Competition.

They appointed Mr. H. A. Smith, Mr. T. Neame, and Mr. R. Bruce Ward to assist the writer in organising the Competition, and the energetic Secretary of the Society, Mr. Percy Watson, who entered heart and soul into the scheme, undertook to do his utmost to obtain entries.

Mr. R. M. Wilson, the Principal of Wye College, generously undertook, on behalf of the Wye College authorities, to arrange for carrying out the chemical analyses of samples of milk and to lend the use of a suitably equipped laboratory and the services of a laboratory assistant at the South Eastern Agricultural College, Wye, if the Kent Education Committee would engage a properly qualified bacteriologist to carry out the bacteriological examinations.

The Kent & Sussex Farmers, Ltd., also gave the Competition their support and presented a Silver Challenge Cup for award to the winning competitor.

3. The Rules.

The following are the Rules, as finally agreed upon after consultation with the National Institute for Research in Dairying, Reading, Mr. R. M. Wilson and Mr. A. Hay, who had had experience of Clean Milk Competitions in Essex, and Mr. J. Porter, who had carried through a Clean Milk Competition in Buckinghamshire :—

1. PRIZES.

(a) The Kent and Sussex Farmers, Ltd., have very generously undertaken to provide a Challenge Cup for award to the winning competitor, to be held for one year.

(b) A Diploma will be awarded to each competitor who, in the opinion of the judges, reaches a sufficiently high standard, and a Certificate will also be awarded to each regular milker on a diploma farm. All competitors who are successful in obtaining a diploma, and also any competitor whose milk improves in cleanliness during the progress of the Competition to such an extent as, in the opinion of the judges, to earn the reward will have their entry fee of £1 returned to them.

(c) Money prizes of £5, £4, £3, £2, and £1 will be distributed amongst the workers on the first five diploma farms.

2. DURATION OF THE COMPETITION.

The Competition will extend over three months, from the beginning of February to the beginning of May.

3. MINIMUM SIZE OF HERD.

The Competition is open to any dairy herd in the administrative County of Kent not producing Grade A milk, provided that there are not less than 10 cows or heifers in milk during the Competition. Where Grade A milk is produced, the cows in the Grade A herd may not be entered in the Competition.

4. SAMPLES OF MILK.

Competitors will be required to take and send for bacterial examination six samples representative of their bulk milk as sent from the farm at stated intervals. This examination (bacteriological and chemical) will be conducted at Wye College. Bottles for the purpose will be provided and will be despatched by the farmer to Wye College by post. An authorised representative of the Committee will make surprise visits at any time during the period of the Competition for the purpose of taking samples of milk on a competitor's farm.

5. INSPECTION OF COWSHEDS, UTENSILS, METHODS OF MILKING, ETC.

The Inspecting Judge will pay at least one surprise visit to each competitor's herd at milking time and award marks according to a scale of points which are directly under the control of the farmer, e.g., the general health of the cows, the suitability and care of the utensils and other equipment used in handling the milk, the general method of handling the milk, etc.

6. DISPUTES.

The Committee reserve the right to refuse any entries or to alter the rules if found advisable, and in the event of any dispute arising the Committee's decision shall be final.

Telephone: 407 CHATHAM.

HILLIER'S CREAMERY,

197, High Street,
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Highly Recommended for PURE MILK
(Free from Preservatives)

:: and all DAIRY PRODUCE. ::

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Kent.

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Oils, Colours, White Lead, Varnishes, &c. :: Agent for Valour Stoves.
Repairs of all kinds.

DAIRY UTENSILS A SPECIALITY.

7. Entry Fee.

An Entry Fee of £1 per competitor will be charged to ensure bona-fide entries.

8. Basis of Awards.

The Awards will be made on the following scale of points :—

Examination of Milk		900
Bacterial Content and Keeping Qualities	800	
Chemical Analysis	100	
Inspection on the Farm		600
Health of Cows	100	
Equipment	100	
Methods	400	
Total possible marks		1,500

These Rules, as set out above, were submitted to the Ministry of Agriculture, who gave them their approval and undertook to pay two-thirds of the net cost of running the Competition.

4. Entries.

The intention to hold the Competition was announced in the December 1922 issue of the Kent Farmers' Union Journal, and Mr. Percy Watson, the Secretary of the Kent Milk Recording Society, circularised the members of his Society. A circular letter was also sent out to between 70 and 80 likely competitors known to the writer. As a result, 53 entries were received, which is a far larger number of entries than has been received for any Clean Milk Competition held in any county previously. Forty-one out the 53 entries came from members of the Kent Milk Recording Society. The entries included one from Wye College, which the Committee decided could only be accepted on condition that no prize was taken, except a diploma, if the College was successful. It was felt that farmers might hesitate to enter for the Competition if they knew that they had to compete against Wye College with all the scientific knowledge at its command. There was one other entry, where the herd consisted of less than 10 cows, which was accepted on the same condition. Entries were refused from dairy farmers already producing Certified or Grade A milk, because it was felt that with the increased price they were getting for their milk and the experience they had already acquired it would be unfair to other competitors to accept their entries.

5. Inspection Score Card.

All competitors were advised, before the Competition began, to read an article written by Mr. J. Mackintosh in the April 1922 issue of the Ministry of Agriculture Journal and to obtain a copy of the Ministry of Agriculture's Leaflet No. 151 on Cleanliness in the Dairy. They were sent a copy of the Score-card that would be used by the Inspecting Judge, Mr. T. W. McDougall Porter, when he made his surprise visit, so that they might know what were the important points that the judge would look for and how many marks would be awarded for each. The Score-card used was the official one recognised by the Ministry of Health, slightly amplified.

The details of the Score-card are set out below, with the maximum number of marks obtainable for each item, the average number of marks that were awarded to the 53 competitors at the time of their first inspection, and the marks obtained by the herds scoring the highest and the lowest marks.

		Marks Awarded.		
	Max. Marks.	Average of all Herds.	Best Herd. No. 8	Worst Herd. No. 23
Health of Animals	100	98	100	100
Deduct 10 for every cow with bad teats or udder.				
Deduct 20 for every waster.				
Food and Water (max. 8).				
Food clean and wholesome	2	2	2	2
Water clean and fresh	4	4	4	3
Water abundant and convenient	2	2	2	2
Location and Construction of Cowshed (max. 29).				
Well drained	1	1	1	1
Free from contaminating surroundings	1	1	1	0
Impervious floor	3	2	3	3
Raised standing space and efficient gutters	3	2	0	1
Impervious walls and easily cleaned roof	2	1	2	1
Proper stall and manger	2	2	2	2
Drainage from gutters	3	2	0	0
Provision for daylight 3 sq. ft. per cow 3 2 sq. ft. per cow 2 1 sq. ft. per cow 1	3	2	3	1

AYRSHIRE CATTLE.

The "Eglinton" Herd.

The property of The Earl of Eglinton,

HORNS LODGE, TONBRIDGE, KENT.

Telephone: 161 Tonbridge.

What's Wanted!

High Production. Rich Milk. Healthy Cattle.

Clean Methods. Clean Milk.

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L. H. MALLEY,

DAIRYMAN,

SMALLBROOK FARM,
SPELDHURST, KENT.

Fresh, Clean Milk from our own cows

All cows recorded under the Ministry of Agriculture.

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Nursery Milk from Special Tuberculin Tested Jersey Cows a Speciality.

* * * * *

Fresh Dairy Butter, Cream & Eggs.

Customers waited on twice daily.

			Marks Awarded.		
		Max. Marks.	Average of all Herds.	Best Herd. No. 8	Worst Herd. No. 23
Artificial Light.	Candles 1, Lamps 2	2	2	2	2
Air Space	600 sq. ft. per cow 3 500 sq. ft. per cow 2 400 sq. ft. per cow 1	3	3	3	3
Provision for fresh air	Through walls 1 Through Roof 1 Windows to open wide 1	3	2	3	2
Water supply for washing stalls, gutters, etc.		2	2	2	2
Equipment for washing hands		1	1	1	0
LOCATION AND CONSTRUCTION OF MILK ROOM (max. 11).					
Free from contaminating surroundings		3	2	3	0
Impervious floor and outside drainage		2	1	1	0
Impervious walls and suitable ceiling		2	1	2	0
Adequate light and ventilation		2	1	1	0
Facilities for cleansing		2	2	2	0
CONSTRUCTION OF UTENSILS (max. 23).					
Milking Pails	Covered max. 8 Others max. 4	8	4	8	0
Strainer	Cotton Wool Disc 2 Straining Cloth 1 Butter Muslin 0	2	1	2	0
Cooler	With Covers max. 6 Without max. 5	6	4	5	5
Transit Vessels	Glass bottles max. 7 10-gallon churns 4 17-gallon churns 2	7	3	5	2
FACILITIES FOR CLEANSING UTENSILS (max. 27).					
Separate room for washing utensils		5	2	5	5
Adequate supply of clean water		2	2	2	2
Steam	Steam max. 15 Boiling water max. 10	15	9	15	10
Sterilising Equipment	Steamer but no closed chamber 3	5	1	3	0
METHODS.					
(a) Cows (max. 70).					
Clean	Free from obvious dirt max. 15 Properly brushed down max. 20	20	12	15	0
Udders and flanks washed and wiped preparatory to milking	Cleaned with moist cloth max. 25, cleaned with dry brush max. 15.	35	18	35	0
Clipping of hair on udders		15	5	8	0
(b) Cowsheds (62).					
Cleanliness of floor	Bedding absent during milking max. 10. If much bedding max. 5.	10	5	5	3
Cleanliness of walls and partitions		4	3	4	0
Cleanliness of roofs 1, rafters 1, ledges 1		3	1	3	1
Cleanliness of mangers and water troughs		4	3	4	1
Cleanliness of windows and lights		4	2	4	0
Efficient ventilation		5	4	5	2
Air at milking time free from dust	If hay or straw is eaten during milking 0.	5	4	5	5
Air at milking time free from odours	If any cruciferous plant is eaten during milking 0.	5	4	5	0
Yards around cowshed clean		5	3	4	4
Yards around cowshed drained		5	3	4	4
Manure removed frequently, all removed half hour before milking		5	4	5	3
Manure removed to a distance, not on prevailing wind side of cowshed		5	3	5	0
Milking Suits and Caps worn		2	1	1	0
(c) Milk Room (25 max.).					
Cleanliness of floor		5	4	5	0
Cleanliness of walls and roof		5	3	5	0
Freedom from dust and odours		5	4	5	0
Used solely for handling and storing milk		5	4	5	0
Yards around milk room clean		3	2	3	0
Yards around milk room drained		2	1	2	0

J. STEVEN, Farmer & Dairyman

(Member of Kent Milk Recording Society).

FORCE GREEN FARM,

WESTERHAM

AWARDED DIPLOMA
in Clean Milk Competition (organised by Kent Education Committee in conjunction with Kent Milk Recording Society).

:: Pure Rich ::

Jersey & Guernsey Milk

From Tested Cows,

SUPPLIED IN SEALED BOTTLES TO ORDER.

FRESH BUTTER made from pure separated cream.

CREAM. NEW LAID EGGS. POTATOES.

All Orders promptly attended to

Deliveries in Westerham twice daily. *'Phone 75, Westerham.*

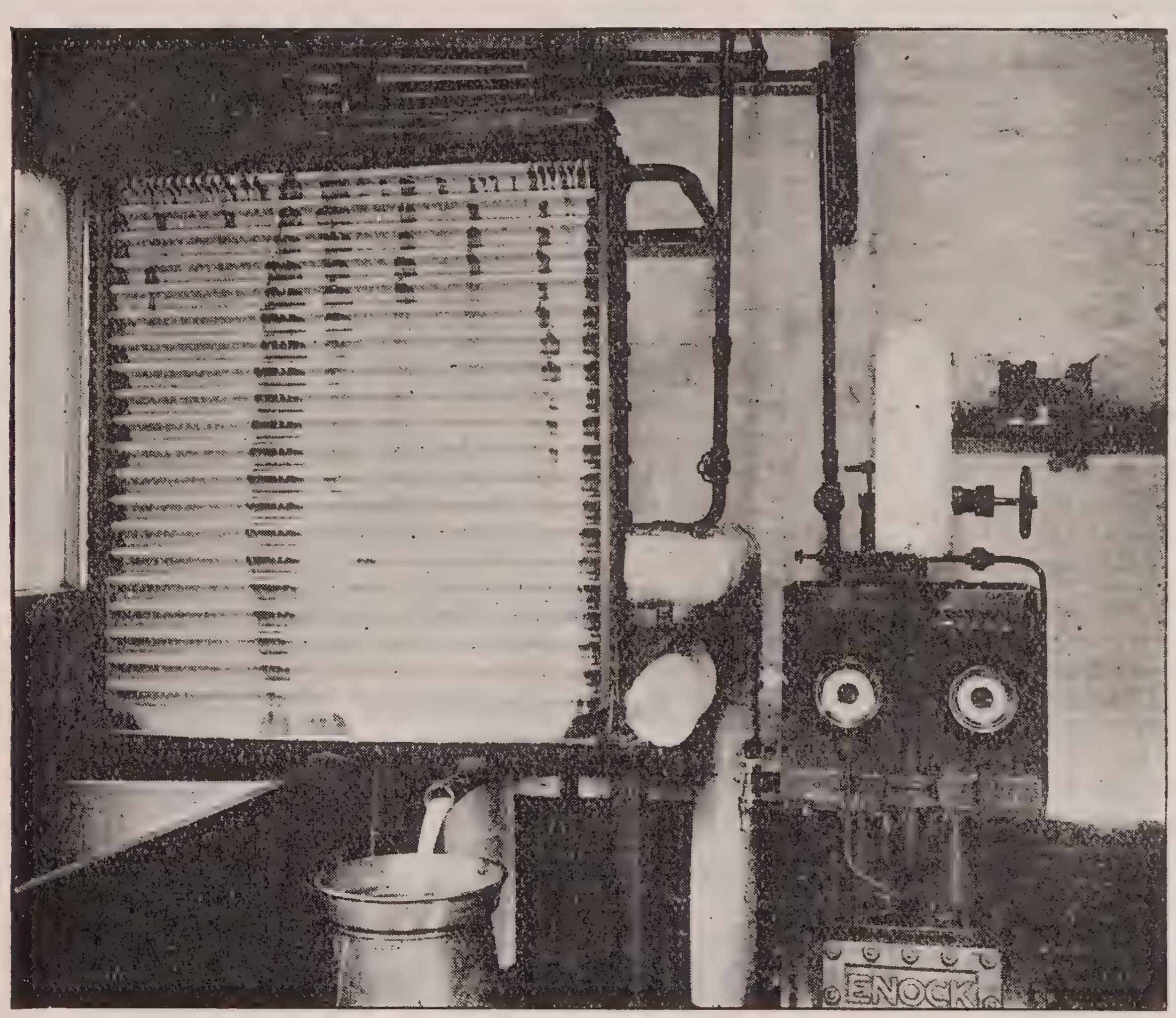
	Max. Marks.	Marks Awarded. Average of all Herds.	Best Herd. No. 8	Worst Herd. No. 23
CLEANLINESS OF UTENSILS (max. 105).				
Washed with cold water first 1, then hot water and soda 2, then cold water 2; total 5. If scalded add 5, steamed add 10.				
Cleanliness of milking pails	15	7	15	0
Cleanliness of strainer	15	8	15	0
Cleanliness of cooler	15	4	15	0
Cleanliness of transit vessels	15	8	15	10
Cleanliness of other equipment	10	7	10	0
Utensils protected from contamination	30	16	18	10
In steriliser max. 30.				
On clean bench under cover in strong light max. 20.				
On clean bench in open max. 15.				
On clean bench in shade max. 10.				
Cleanliness of milking stools	5	3	5	0
THE OPERATION OF MILKING (max. 55).				
Cleanliness of milkers 5, suits, etc., 4, caps 1	10	7	8	2
Clean, dry hands	20	10	20	0
Clean dry milking max. 20.				
Clean wet milking max. 5.				
Use of covered milking pails	20	3	20	0
Discarding of fore milk. Into straw max. 3	5	2	3	0
HANDLING OF MILK (max. 85).				
Cleanliness of attendants in milk room. Milkers max. 5	10	5	4	2
Milk removed immediately from cowshed without pouring from pail	15	10	0	0
If left till two buckets ready max. 8.				
Efficient straining. Butter muslin 0	10	7	10	0
Cooled immediately after milking each cow	5	3	3	0
Cooled to 45 degrees or below	35	18	31	19
For each degree above 45 and up to 60° deduct 2 points.				
Above 60 deduct another half point.				
Period and manner of storage	5	4	5	2
Method of transportation	5	4	4	4
Open van max. 4. Closed van max. 5.				
Total	600	381	523	221

On receipt of this score card two or three of the competitors took fright and were with difficulty persuaded to refrain from withdrawing their entires. One entry was in fact withdrawn. It was suggested by one competitor that inspections were unnecessary, and that the result of the competition should depend solely on the examination of the samples of milk. The writer, however, attaches considerable importance to the inspections and the inspection marks. The inspection marks act as a check on the accuracy of the bacterial counts, and vice versa. If the bacterial counts are good, the milk has been produced under good conditions, and the inspection marks will (or should) be high. But if the bacterial counts are low, the milk has been produced under bad conditions, and the inspection score card will (or should) show where the trouble lies. The inspection score card is, therefore, a means of tracing bad results to their causes. The Competition was designed to have a strong educational value. It is not enough to tell the farmer that his milk is clean or dirty; if it is dirty he wants to know where he is at fault. The score card was designed to enable this to be done.

Another complaint received against the score card was that marks were to be awarded for the construction of the buildings, which is a matter beyond the control of the tenant farmer. The ground for this complaint was recognised, but, out of a total of 1,500 marks, only 600 marks are awarded for inspections, and of these 600 marks the construction of the cow shed and milk room scores a maximum of 40. This is a very small proportion. The construction of the buildings plays some part, though only a small part, in the ultimate condition of the milk, and if no allowance was made for this in the inspection marks, a true comparison between the score card marks and the marks for bacterial counts would not be obtained. However, the justice of this grievance was realised, and the Inspecting Judge was instructed to mark leniently for the structure of the buildings.

Several of the Competitors did not adopt any means of cooling their milk, but delivered it to their customers warm from the cow. There are 61 marks allotted on the score card (out of a total of 600 marks) for the construction and cleanliness of the cooler, the temperature to which the milk is cooled, and so on, so that, if the score card system of marking had been strictly adhered to, full marks for these competitors would have been 539 marks (600 less 61). The non-cooling of milk is to be discouraged because bacteria will propagate in warm milk more quickly

UNDOUBTEDLY the best Milk for children is, as Dr. Nathen Raw has said: "Fresh Milk from a healthy animal obtained under clean conditions."—A. STANLEY GRIFFITHS, M.D., *Research Bacteriologist, at the National Milk Conference, London, Oct., 15, 1922.*



Milk Cooling at our Dairy. Capacity, 200 gallons per hour to 45 degrees Farh.

ALL Milk retailed by me is Fresh Milk obtained under clean conditions. No preservatives or artificial means are used to preserve Milk, but good keeping qualities are assured by low temperature cooling during the hot weather. We invite comparisons.

Two of our Farms were awarded Diplomas for Clean Milk in Kent Competition, 1923.

WM. ROSE, Halls Farm Dairy,
2 SUNDRIDGE PARADE, BROMLEY.
'Phone 1235.

than in cold milk, but a loss of 61 marks seemed too great a handicap to these competitors whose customers preferred—in some cases demanded—warm milk and had never made any complaints about the milk not keeping properly. The scoring for these competitors was therefore modified, by raising the marks they obtained on the score card in proportion as 600 is to 539 and then deducting 10 points as a penalty because no cooler was used.

Beginning of the Competition.

The Committee were exceedingly fortunate in procuring the services of Mr. F. Procter, B.A. (Cantab.), Cambridge Diploma in Animal Husbandry, who had been doing some work at the National Institute for Research in Dairying, Reading, to give his full time to the bacterial examinations of the milk samples. He took up his residence at Wye for that purpose. It was intended that the competition should start in the middle of January, but the firm that was making the travelling boxes for the sample bottles of milk failed to deliver the goods to time, so that the first samples of milk could not in fact be taken until January 30th. The competition ended on May 8th.

7. Method of carrying out the Competition.

The fifty-three competitors were arranged into three groups with thirteen competitors in each and one group of fourteen competitors. Each competitor had to submit one sample of morning milk every fortnight. Two sterilised glass 8 oz. bottles were sent to him, and he was warned not to remove the rubber stoppers until the time when the samples were to be taken. He was given full instructions as to how the samples were to be taken from the churns containing the milk of the whole herd, and he filled in a paper stating the time at which the sample was taken and the temperature of the milk. The two sample bottles were then sent by the first available post to Wye College, and one sample was used by Mr. Proctor for his bacteriological examinations, and the other sample by Major L. W. Evans, M.C., B.Sc., A.I.C., for the chemical analysis. The competitors were arranged in four groups of 13 to 14 competitors each, so that 13 or 14 samples might be taken every Monday and Thursday morning, and arrive at Wye College the following morning. In this way the work of examining the samples in the laboratory was spread out evenly over the week, and a sample of milk was received from each competitor at regular fortnightly intervals.

The 8 oz. glass sample bottles were obtained from Messrs. H. Poths & Co., Farringdon Street, E.C.4, price 18s. 3d. per gross. The travelling boxes, made of strong corrugated cardboard, each box to take two samples of milk, were purchased from Messrs. Thompson & Norris, Acton Corrugated Paper Works, Warple Way, Uxbridge Road, W., price 19s. 3d. for 56 boxes. These boxes and bottles served their purpose very well. A pair of empty sample bottles, packed in a box, cost ninepence for postage to the competitor. The return postage of the full bottles cost 1s. This was paid by the competitor.

8. Difficulties Experienced.

Troubles arose at the beginning of the competition through the corks supplied with the bottles being inferior, and it was found necessary to replace them with rubber ones. Another trouble experienced was caused by delays in the postal delivery of samples of milk. One or two samples in every round arrived late at the Laboratory, and where the farmer could produce satisfactory evidence that the delay was not caused by any slackness on the part of himself or any of his employees, these samples were cancelled and supplementary samples accepted. Another trouble experienced at the beginning was that competitors filled the sample bottles quite full with milk. When the milk got warm in the post it expanded and was liable to force out the cork. Further, some of the cream, in the case of a full bottle, gets attached to the bottom of the cork, and it then becomes practically impossible to get a true sample for analysis. About an inch of air space should always be left between the top of the milk and the bottom of the stopper.

At the commencement of the Competition it was suggested that it was a weakness to allow the competitors to take their own samples of milk, because they might "fake" them. Undoubtedly the taking of the samples by the farmers themselves is open to criticism, but it is the only possible way of getting such a large number of samples taken. There were, however, safeguards against "faked" samples. Most of the competitors, even if they had the desire, had not sufficient knowledge to enable them to tamper with the samples in such a way as to prevent them from being detected in the chemical or bacteriological laboratory. Any sample that behaved in any way abnormally was carefully examined for preservatives, etc. Moreover, surprise samples of milk were taken at the farms of all the competitors—at least one sample, and in most cases two samples. These were examined bacteriologically and chemically, and the results compared with the samples submitted by the competitors. The score card marks awarded by the Inspecting Judge were a further check, for high marks for bacterial counts, obtained by faking the samples of milk, would be revealed by low score card inspection marks, for the visits of the Inspecting Judge were always surprise visits. It is very satisfactory to be able to report that not a single case of deliberate "faking" was detected during the whole course of the Competition, and that the surprise samples of milk taken by the Inspecting Judge agreed very closely with the farmers' own samples.

Grazing Herds on W. F. Skilton's Dairy Farm, at Sundridge Park.

Where the Milk Question is Studied!

¶ The hygienic conditions and modern equipment on our dairy farms at Sundridge Park and Bickley ensures a milk supply of clean, rich, creamy quality. Our herds are always maintained in the pink of condition and the most scrupulous cleanliness is observed both in the Milking Sheds and Dairy. No new milk substitutes of any kind are used—as the milk comes from the cows in its rich natural state—so it is delivered direct to customers, twice daily.

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Blackbrook Farm, Bickley.

9. Cases of Bad Sampling.

There were, however, some cases where, through lack of knowledge, samples of milk taken were not true samples. A conspicuous case was Herd No. 50, a Guernsey herd, which on two occasions, the third and fourth rounds, submitted samples of milk containing 9.50 per cent. of butter fat. A surprise visit was paid to this herd, and the case very carefully and thoroughly investigated. It was found that the samples taken for the first and second rounds, which were quite normal samples, had been taken by holding the sample bottles under the cooler until they were filled. The cowman then noticed that the instructions sent out with the bottles were to the effect that the samples were to be taken from the churn. For the third and fourth samples, therefore, the samples were taken by dipping a quart jug into the top of the churn whilst the last of the milk was still running from the cooler and the first milk had been in the churn for more than an hour. The cream of Channel Island milk always rises very quickly because the globules of butter fat are exceptionally large and the resulting samples were consequently exceptionally rich in butter fat. It was quite evident that there had been no intention to defraud, and immediately the owner of the herd was informed of the results of the analysis (which unfortunately was not until after the fourth sample had been taken) the method of taking the samples was immediately changed. As cream rises, it brings up many of the bacteria in the milk with it. Cream, therefore, contains a rich concentration of bacteria, and these two samples of milk which contained a higher proportion of butter fat than the four true samples also contained many more bacteria, and scored lower marks accordingly. The cowman of Herd No. 50 was not the only offender; altogether twenty samples of milk out of 318 samples submitted by the competitors were rejected and ignored, so far as scoring for butter-fat was concerned, on account of bad sampling. Nearly all these cases were with herds of either Jersey or Guernsey cows.

It is not easy, as Mr. Procter pointed out in one of his fortnightly reports to the competitors, to take a sample of milk that is exactly representative of the bulk. To get such a sample the milk should be thoroughly well stirred with a plunger, long rod or ladle, to mix the cream with the milk before the sample is taken. Another good method is to empty the milk backwards and forwards from one churn into another. It is surprising how quickly the cream rises in warm milk, especially Jersey or Guernsey milk.

10. Moulds.

Moulds developed on many of the cultures, due to dust having got into the milk. This counted against the competitor, and was generally due to the handling of hay or straw in the cow shed just before or during milking. In the case of Herd No. 35 in the third round nearly 50 per cent. of the colonies were moulds. Except for this, it was a remarkably clean sample of milk; it was evidently spoilt by letting dust in. In the fourth round the milk from Herd No. 53 contained many moulds, and enquiry showed that threshing was in progress on this farm when the sample was taken. Moulds developed conspicuously in seventeen different samples of milk.

11. Interim Reports to Competitors.

At the end of every fortnightly period a circular was prepared and sent out to each competitor showing the total number of bacteria and the number of coliform organisms found per cubic centimetre of the sample submitted, the percentage of butter fat it contained, and the marks awarded for keeping properties. The figures for every herd were given, so that a competitor could compare his results with those obtained by other competitors but the identification of each herd was hidden under a code number. Each competitor was told the number of his own herd only, so that he could not identify the herds of his neighbours. The results of the surprise inspections of the herds at milking time, which were made by Mr. T. W. McDougall Porter, M.C., N.D.A., Assistant to the Agricultural Organiser, were circulated in a similar way, together with criticisms of what he found, and suggestions as to how improvements might be effected. It was recognised that these candid criticisms might possibly give offence to certain of the competitors, but on the other hand the competitors were anxious to know where they were at fault, and this was a means of informing them. It is a pleasure to be able to record that no ill-feeling was ever occasioned by these criticisms. They were accepted in the spirit in which they were given, and thoroughly appreciated by the competitors. In fact, the competitors were anxious for a second surprise inspection in order that improvements that they had carried out since the first surprise visit might be noted and higher marks obtained. It was impracticable to arrange for all the competitors to be visited twice, but more than half of them received a second visit.

The fortnightly circular to competitors also included statements, usually prepared by Mr. Procter, giving advice on such matters as the best methods of cleansing the utensils, how to make a home-made steriliser, the injurious effects of bacillus coli, and how to keep it out of the milk, the causes of milk going sour, the importance of preventing the presence of dust in the cow shed at milking time, and how to prevent it by spraying, etc.

The first fortnightly return was not sent out until after the second samples of milk had been received from all competitors, the second fortnightly return was sent out immediately after the third samples of milk had been received from all competitors, and so on. In this way all competitors received the same advice at a time when all had submitted the same number of samples of milk.

CONSTITUTION——MILK——TYPE

Linton Park Pedigree . .
Herd of Guernseys . .

The property of
Col. F. S. W. Cornwallis.

When requiring **COWS**, in **CALF** Heifers or **CALVES** (Bulls or Heifers) write for particulars to :—

SYDNEY E. HARRIS,
LINTON PARK ESTATE, MAIDSTONE.
Telephone No. Boughton Monchelsea 32.

DAIRY SHORTHORNS.

Hugh Harvey, Bockingfold, Goudhurst.

5 years' officially Milk Recorded Herd of Non Pedigree Dairy Shorthorns sired by Pedigree Ministry Bulls. - - Foundation Cows. First Cross Bull Calves, earmarked by The Kent Milk Recording Society, with proved milking ——pedigrees at commercial prices.——

INSPECTION INVITED. —— *Telephone :—Goudhurst 36.*

As evidence of the manner in which this Herd is conducted, we gained our 'Clean Milk' Diploma in 1923—copy on application.

CERTIFIED GRADE A MILK CONTRACT DESIRED.

The Wintersell Herd of British Friesians

consisting of some of the best blood and headed by a **Son of KIRKHILL** (Imp.) **KAREL.**

Also FOUNDATION DAIRY SHORTHORNS headed by a CONJUROR BULL.

Young Stock of both breeds generally for disposal, also breeder of Rhode Island Red and Black Leghorn Poultry. *Daily Records kept.*

Apply: **R. J. DOWNING,**
WINTERSELL, EDENBRIDGE, KENT.

12. **System of Scoring.**

Some difficulty was experienced in devising a system of scoring, and advice was sought, and freely given, by Professor T. B. Wood and Mr. J. A. Venn, of the School of Agriculture, Cambridge.

The samples of milk, on arrival at the laboratory, were examined for Coliform Organisms, total number of bacteria of all sorts per cubic centimetre of milk and percentage of butter fat. Each sample was also kept to see how long it would remain sweet and untainted.

The Coliform Organisms are a particular group of bacteria of an objectionable nature, and every sample of milk was examined to find out whether they were present and in what quantities. The presence of these organisms in a sample of milk is a very reliable indication of manure having got into the milk; the greater the number, the worse the manurial contamination. Those farmers whose milk was found to contain them were advised to keep a watch for contamination of this kind. Their presence or absence in a sample of milk is detected by inoculating a specially-prepared broth containing Lactose sugar with varying quantities of the milk, e.g., 1 c.c., 1/10 c.c., and 1/100 c.c. If the organism is present, it acts upon the lactose, producing an acid and a gas, each of which can be detected. In some samples of milk there will not be enough of these organisms present in 1/100 c.c. of milk to produce gas, but there may be enough of them in 1/10 c.c., whilst in a purer sample of milk no trace of gas may be detected when as much as 1 c.c. of the milk has been added to the broth. The method of scoring for Bacillus Coli and Total Number of Bacteria was as follows:—

Full Marks for each sample of milk 100.

If B. Coli could be detected in 1 c.c. of milk deduct 10 points.
If B. Coli could be detected in 1/10 c.c of milk deduct 20 points.
If B. Coli could be detected in 1/100 c.c of milk deduct 30 points.
If B. Coli could be detected in 1/1000 c.c of milk deduct 40 points.

The "Bacterial Count" is the number of bacteria of all sorts found in 1 c.c. of the sample of milk submitted. The method of scoring adopted for "Total Bacterial Count" was to make further deductions as follows:—

500 bacteria or less	Deduct 0	64,001 to 95,000	Deduct 37
501 to 750	,, 2	95,001 to 125,000	,, 40
751 to 1,000	,, 5	125,001 to 187,000	,, 42
1,001 to 1,500	,, 7	187,001 to 250,000	,, 45
1,501 to 2,000	,, 10	250,001 to 375,000	,, 47
2,001 to 3,000	,, 12	375,001 to 500,000	,, 50
3,001 to 4,000	,, 15	500,001 to 750,000	,, 52
4,001 to 6,000	,, 17	750,001 to 1,000,000	,, 55
6,001 to 8,000	,, 20	1,000,001 to 1,500,000	,, 57
8,001 to 12,000	,, 22	1,500,001 to 2,000,000	,, 59
12,001 to 16,000	,, 25	2,000,001 to 3,000,000	,, 62
16,001 to 24,000	,, 27	3,000,001 to 4,000,000	,, 64
24,001 to 32,000	,, 30	4,000,001 to 6,000,000	,, 67
32,001 to 48,000	,, 32	Over 6,000,000	,, 70
48,001 to 64,000	,, 35		

The surprise sample from each herd scored double if only one surprise sample was taken; if two surprise samples had been taken, each scored single marks.

The points for Keeping Properties were awarded according to the number of days each sample remained sweet, without a taint and without clotting, when kept in an incubator at a standard temperature of 60° F. For each half-day the sample remained sweet, starting from the time the sample was taken, two points were awarded.

For the percentage of butter fat an average was taken of the analyses of the six mornings samples submitted by each competitor, and the evening surprise sample scored double. Where two surprise samples were taken, each scored the same as the farmer's sample. All abnormal figures, due to bad sampling, were ignored in arriving at the average composition. An average of six per cent. of butter fat scored full marks (100), and three marks were deducted for every 0.1 per cent. below this standard down to 5.0 per cent. butter fat, which scored 70 marks. From 5.0 per cent. butter fat downwards two marks were deducted for every 0.1 per cent. The scoring was therefore as follows:—

6.0 per cent. scores	100 marks.	4.2 per cent. scores	55 marks.
5.3 ,, ,, ,,	83 ,,	4.1 ,, ,, ,,	53 ,,
5.2 ,, ,, ,,	80 ,,	4.0 ,, ,, ,,	50 ,,
5.1 ,, ,, ,,	78 ,,	3.9 ,, ,, ,,	48 ,,
5.0 ,, ,, ,,	75 ,,	3.8 ,, ,, ,,	45 ,,
4.9 ,, ,, ,,	73 ,,	3.7 ,, ,, ,,	43 ,,
4.8 ,, ,, ,,	70 ,,	3.6 ,, ,, ,,	40 ,,
4.7 ,, ,, ,,	68 ,,	3.5 ,, ,, ,,	38 ,,
4.6 ,, ,, ,,	65 ,,	3.4 ,, ,, ,,	35 ,,
4.5 ,, ,, ,,	63 ,,	3.3 ,, ,, ,,	33 ,,
4.4 ,, ,, ,,	60 ,,	3.2 ,, ,, ,,	30 ,,
4.3 ,, ,, ,,	58 ,,	3.1 ,, ,, ,,	28 ,,

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13. **Results Obtained.**

The total number of samples of milk examined was 395, these samples representing 11,731 gallons of milk. Licensed producers of Certified or Grade A milk were not allowed to compete in the competition, because it was felt that ordinary dairy farmers might consider that they would have no chance against such competitors, and yet, out of the 395 samples examined, no less than 212 samples (representing 6,300 gallons of milk) came up to Grade A milk standards for the number of bacillus coli, and total number of bacteria of all kinds present, whilst 109 samples (representing 3,250 gallons of milk) even came within the standards for certified milk. To put it another way, the 53 competitors were producing between them 3,150 gallons of milk daily, and of the samples taken of this milk during the three months of the competition 54 per cent. came up to Grade A standards, and 27 per cent. up to certified milk standards for bacterial contents. This is a very high commendation for Kent milk.

(a) Bacterial Counts.

The standard laid down in the Milk (Special Designations) Order, 1922, for Certified Milk is not more than 30,000 bacteria per c.c. of milk, and no coliform organisms traceable in 1/10 c.c. The standard for Grade A milk is not more than 200,000 bacteria per c.c., and no coliform organisms in 1/100 c.c. In each case official samples may be taken at any time before the milk reaches the consumer. There are, of course, additional conditions required of licensed producers of certified or Grade A milk, which will be found in a printed memo, Number 77/Foods, entitled Sale of Milk under Special Designations, copies of which can be obtained from His Majesty's Stationery Office, Imperial House, Kingsway, London, W.C.2.

There was a gradual improvement in the bacterial content of the milk as the competition proceeded, as the following figures show :—

The improvement effected during the course of the competition by the competitors as a whole can be gauged by comparing the average number of marks obtained by the 53 competitors for total counts, b. coli and keeping properties of the milk in each round. These figures are as follows :—

No. of Samples up to Certified Milk and Grade A Milk Standards, and average number of Marks obtained (max. 116) :—

Dates.	Grade A	Certified Milk.	Average Marks.
1st Round.—Jan. 30th to Feb. 9th ...	25	9	49·3
2nd Round.—Feb. 14th to Feb. 24th	26	10	52.0
3rd Round.—Feb. 27th to March 9th	24	10	51.6
4th Round.—March 16th to March 27th	32	21	62.9
5th Round.—April 3rd to April 16th	25	14	55·3
6th Round.—April 19th to April 30th	30	20	61.5
	Average ...		55·4

The average number of marks obtained by the First Surprise Samples from all herds, taken by the Inspecting Judge between Feb. 1st and April 6th, was 59.0. It is interesting to note that the surprise samples were slightly better than the samples taken by the competitors themselves during the same period.

The figures for the 24 herds to which the Inspecting Judge paid two surprise visits show a marked improvement at the time of the second visit. The average number of marks obtained by the surprise samples from these 24 herds were as follows :—

Dates.	Grade A	Certified	Max.—116.
1st Surprise Visit—Feb. 1st to April 6th ...	14 samples	5 samples	55·9
2nd Surprise Visit—April 7th to May 2nd ...	16 samples	10 samples	69·5

As regards individual competitors, no less than 47 competitors succeeded in producing at least one sample of milk up to Grade A standards for total bacterial counts and bacilli coli, and 34 competitors produced at least one sample of milk up to the certified milk standards. The only herds that failed to produce a sample up to Grade A standards were herds Nos. 1, 4, 23, 27, 29 and 34, and it is worthy of note that Nos. 1 and 4 were the only competitors who used mechanical means of milking. The best performances of individual herds were the following :—

Herd No. 2.—Every sample of milk up to Certified Milk standards.
,, ,, 8.—7 Samples Certified, the remaining 1 sample Grade A.
,, ,, 36.—7 ,, ,, , ,, 1 ,, ,, ,,
,, ,, 52.—6 ,, ,, , ,, 1 ,, ,, ,,
,, ,, 25.—7 ,, ,, , 1 sample below Grade A.

(b) Keeping Properties.

The gradual improvemnet in the milk as the Competition proceeded can also be appreciated if the marks awarded for the Keeping Qualities of the milk are examined The samples were kept at a standard temperature of 60° F., and two marks were awarded for every half-day the samples remained sweet and untainted. The average figures for each round were as follows :—

Telephone:
Ash 18.

Telegrams:
Petley, Ash 18.

Chas. Petley & Co.

Auctioneers, Valuers,
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	Marks.	Milk remained sweet.
1st Round.—Jan. 30th to Feb. 9th ...	8.41	.... 2 Days. 2 Hours.
2nd Round—Feb. 14th to Feb. 24th ...	8.79	.... 2 ,, 5 ,,
3rd Round—Feb. 27th to March 9th ...	9.13	.... 2 ,, 7 ,,
4th Round—March 16th to March 27th ...	10.49	.... 2 ,, 15 ,,
5th Round—April 3rd to April 16th ...	10.90	.... 2 ,, 17 ,,
6th Round—April 19th to April 30th ...	11.77	.... 2 ,, 5 ,,

The First Surprise Samples taken from all competitors between Jan. 30th and April 5th kept sweet on an average for 2 days, 3 hours. The figures for the 24 competitors who received two Surprise Visits were as follows :—

1st Visit—Feb. 1st to April 6th	7.71	.... 1 Day, 22 Hours.
2nd Visit—April 7th to May 2nd	10.42	.... 2 Days, 15 Hours.

Of the total number of 395 samples, 220 samples (representing 6,530 gallons of milk) scored 10 marks or more, and 108 samples (representing 3,200 gallons of milk) scored 12 marks or more. In other words, 55 per cent. of the samples remained sweet and without a taint for 2½ days counting from the time the sample was taken, whlist 27 per cnet. of the samples remained perfectly sweet and untainted for 3 complete days and 24 hours. Sixteen samples remained sweet for 4 complete days and scored 16 marks.

Five more samples remained sweet for 3¾ days and scored 15 marks, and a further 18 samples scored 14 marks, making a total of 39 samples that remained perfectly sweet, untainted and unclotted for 3½ complete days.

(c) PERCENTAGE OF BUTTER FAT.

Out of 318 samples of milk taken by the farmers 20 samples showed an abnormal percentage of butter fat, and were consequently ignored, so far as marks for butter fat percentage were concerned. Of the remaining samples, all morning samples, 42 samples were below 3.0 per cent. butter fat. Every sample of morning milk submitted by Herd No. 2 was below the Government Legal Standard, but the evening sample showed 4.70 per cent. butter fat. Two herds, Nos. 16 and 45, both Jersey herds, gave an average of more than 5 per cent. butter fat for six morning and two evening samples of milk, whilst ten other herds, one of which was a Jersey herd and three were Guernseys, averaged more than 4 per cent. butter fat. The average figures for individual herds ranged from 3.12 per cent. to 5.30 per cent., the average being 3.78 per cent.

14. **The Awards.**

The maximum number of marks obtainable in the Competition was 1,500, and the names and addresses of the five prize-winners, with the names of the regular milkers and the number of marks obtained, was as follows :—

Challenge Cup presented by the Kent and Sussex Farmers, Ltd., and £5.

Herd 8.—Capt. H. Hatfeild, Hartsdown Farm, Margate. 1,258 Marks
Regular Milkers—George Newman, Walter Reeves.

Herd No. 2.—The South Eastern Agricultural College, Wye, closely followed Capt. Hatfeild with 1,253 Marks. This entry, however, was accepted only on condition that, if successful, no prize should be taken.
Regular Milkers—James McNaught, Alfred Cornelius Richardson.

Second Prize (£4).

Herd No. 22.—Mr. B. M. Jenkin, Stowting Court, near Ashford. 1 165 Marks.
Regular Milkers—Miss Barbara Blackburn, Frederick Ernest Hopkins, Sydney Bull.

Third Prize (£3).

Herd No. 52.—Mr. J. Buchanan, Preston, Shoreham, Sevenoaks. 1,136 Marks.
Regular Milkers—Alfred Cheesman, Albert Cheesman, Miss Bella Fife.

Fourth Prize (£2).

Herd No. 25. Mr. H. Howie, Hemminge Farm, Sellindge, Ashford. 1,106 Marks.
Regular Milkers—Hugh Howie, Tom Fagg, Albert Leonard Pilcher.

Fifth Prize (£1).

Herd No. 36.—Mr. J. Pearson, Silcocks, Tenterden. 1,100 Marks.
Regular Milker—Archibald Thomas Hoad.

The prize money was distributed in each case amongst the regular milkers, each of whom also received a certificate. The farmer received a diploma, as also did each of the following competitors who were successful in obtaining more than 1,000 marks out of a possible 1,500 :—

Herd No. 37.—Mr. H. Harvey, Bockingfold Manor, Goudhurst. 1,076 Marks.
Regular Milkers—Archibald Luck, William Apps, Charles E. Harris.
Herd No. 46.—Mr. W. K. Brown, Holmhurst Farm, Beckenham. 1,062 Marks.
Regular Milkers—Frank Lewry, Alfred Joseph Standen, John Dyson.
Herd No. 13.—E. Hollands & Sons, Withersdane Dairy, Wye. 1,051 Marks.

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Regular Milkers—George Reuben Hollands, Frederick Simon Hollands, Sidney William Allard.

Herd No. 35.—Mr. T. R. W. Lunt, Platt Farm, Wrotham Hill. 1,045 Marks.

Regular Milkers—William Miles, William Allcroft, H. B. Thackeray Schwabe.

Herd No. 15.—Mr. A. Gilbert, Belmont, Millstrood, Whitstable. 1,036 Marks.

Regular Milkers—John Charles Baldock, George Marsh, Albert Priest.

Herd No. 44.—Mr. J. Steven, Force Green Farm, Westerham. 1,034 Marks.

Regular Milkers—Frederick Williams, Arthur George Galloway, John Alan Boyd.

Herd No. 32.—Mr. H. G. Mountain, Groombridge, Tunbridge Wells. 1,034 Marks.

Regular Milkers John Alfred Russell, Philip Playfoot.

Herd No. 43.—Greenlees Bros., Gaysham Farm, Westerham. 1,028 Marks.

Regular Milkers—Thomas Greenlees, John Greenlees, Arthur Ernest Bond.

Each of the above-mentioned farmers received a diploma and each regular milker a certificate. The entry fee of £1 was returned to each of them, and also to two other competitors whose milk showed steady and marked improvement in cleanliness during the course of the Competition, namely:—

Herd No. 33.—Mr. J. Percival, Wrotham Hill.

Herd No. 12.—Mr. J. M. Bainbridge, Great Chart, Ashford.

The diplomas and certificates were presented on the showground of the Kent County Agricultural Society at Gravesend on June 20th, 1923, by the Marquis Camden, Lord Lieutenant of Kent. The Kent Milk Recording Society paid the travelling expenses of the head cowman of each successful herd to enable him to attend this function.

15. **Lessons from the Competition.**

The principal lessons to be learnt from the Competition are very well set out in the report of Mr. Porter, the Inspecting Judge, in his report (page 45 to 51). The Competition has proved quite definitely that quite a large quantity of reasonably clean milk is already produced in the county, and that expensive and up-to-date buildings are not essential for its production; they make it easier to produce clean milk, but they are not essential. What is essential is plenty of water and close attention to small details. One small flaw may ruin what would otherwise have been an excellent sample of milk; it may be one careless milker, one dirty cow, one dirty bucket, one dirty tap, or a straining cloth not properly sterilised. Methods are far more important than equipment, and the additional expense in producing reasonably clean milk does not take the form of additional capital outlay so much as of additional time and trouble in getting the udders of the cows and everything else scrupulously clean. The work of keeping the udders of the cows clean is very much facilitated if the long hair on the udder is kept clipped short, either with a pair of scissors, barber's clippers, or a singeing machine. On the udders of Jersey cows long hair is absent, so that in the case of this breed the removal of the hair is unnecessary. Experience has shown that the danger of the cows catching a chill in their udders if this hair is removed is very remote, even if it exists at all. The hair tends to grow again after it has been cut, so that the clipping will have to be repeated every five to ten weeks. It is not a very laborious operation; a man can clip the udders of eight to ten cows in an hour. Twenty-four of the competitors had the udders of their cows clipped.

Another operation that saves time in the daily grooming is the clipping of the hair on the inside of the tail. Manure always tends to adhere to the long hairs, and if these are removed every few weeks with the barber's clippers referred to further time will be saved. To prevent the cows from lying in their own dung and so getting into a filthy condition a proper length of standing for the cows is important; a great deal can often be done by lowering the manger so that the cow can lie more forward, or by raising the standing.

The only equipment necessary for grooming the cows is a wet brush and a curry comb for the tail and hind quarters, a strong cloth for the udders, some buckets of cold or tepid water and wrung-out cloths for wiping purposes. The udders should be washed separately from the tails and flanks and a separate bucket of water and cloth kept for the purpose. Some farmers use a sponge for washing the udders, but a cloth is preferable because it can be sterilised in the steamer; sponges cost more money and cannot be sterilised in this way because they shrivel up. If the hair on the tail and the udder is kept short and the grooming is done regularly, the time taken to clean each cow will average about three minutes in the morning and about two minutes in the evening—cows that are very dirty will take longer; cows that are not dirty will not take so long.

Dust is a great carrier of germs, and it is very important that there shall be as little dust as possible in the cowshed at milking time. The spraying of the cowshed with water just before milking commences is effective in damping down everything. With a knapsack sprayer the operation will only take five minutes. A fine misty spray thrown up into the air so that it gently falls on the cows' backs, on the mangers, on the walls, on the floors, anywhere, is all that is wanted.

Frequent whitewashing will help to keep the cowshed free from dust and cobwebs, and will also make the cowshed lighter and cleaner in appearance. Bacteria do not like light; hence the lighter the buildings the better. Moreover, it is difficult to clean the hind quarters of the cows properly and to wash away the dirt if the cowshed is dark and the cleaner cannot

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see what he is doing, and in this connection it is surprising that farmers have been so slow in using the modern incandescent paraffin or petrol pressure lamps in their cowsheds for the morning milking in place of the old oil hurricane lamps. They give an exceedingly bright light and are safe and economical.

It is absolutely essential, if clean milk is to be produced, to gain the intelligent interest of the men or women employed in the cowshed, that they should understand what bacteria are, how they get into the milk and why all the little details of the work expected of them are so important. This is where education is wanted more than anywhere else, and this is perhaps where this Competition has done most good. It has aroused the interest of the cowmen through the offer of prizes and certificates for the regular milkers, they have read the fortnightly reports, and they have watched the effect of their increased carefulness on the bacterial counts of the samples of milk they have submitted. Young, intelligent and enthusiastic milkers are required as well as an enthusiastic master. Where bad samples of milk have been submitted from some of the farmers there has been a good deal of heart burning amongst the milkers as to which of them was at fault. This is as it should be, for there is nothing like public opinion, even if it is only in the cowshed, for correcting faults. When visiting some of the competing farms with Mr. Porter, the writer was agreeably surprised to note the pride with which many of the milkers donned their white overalls, washed their hands and examined their finger nails before they started to milk. The visit of the successful head cowmen to the Kent County Agricultural Show as the honoured guests of the Kent Milk Recording Society was a great stimulus to these men and much appreciated by them. It was an occasion which they will probably never forget.

The cleansing of the dairy utensils was probably more often the cause of bad samples of milk than all other circumstances combined, and the desirability of having a good supply of steam as well as of water was well illustrated. The enormous importance of proper washing and thorough sterilisation of everything that comes into contact with the milk cannot be overstated. The cooler especially was often found at fault—a long finger nail inserted into the corners of the lowest bar of the cooler would frequently bring out a small quantity of yellowish curd of stale milk. The tap of a distributing churn, or of the tank above the cooler, was frequently another source of contamination; or the seams in an old milking pail. Yet any one of these sources of contamination is sufficient to spoil the sample of milk so far as its bacterial content is concerned.

Partially-covered milking pails, or hooded pails as they are sometimes called, have proved a great help in preventing dust and dirt from getting into the milk during the process of milking. Eleven competitors used these pails, including the first three prize-winners, and seven of them obtained diplomas. They were Herds Nos. 2, 8, 11, 18, 22, 32 34, 35, 37, 38 and 46. If farmers would prevent the udders from getting dirty by clipping off the long hairs and then use the partially-covered milking pail they would be taking a long step towards the production of clean milk. The sooner the milk is removed from the cowshed the better, and if this cannot be done at once the pail in which the milk stands should be provided with a lid to keep bacteria-laden dust from falling in.

The value of a straining cloth is frequently overrated. The straining cloth strains out visible dirt, such as particles of grit, straw or flies, from the milk, but bacteria are far too small for any straining cloth to prevent them from passing through. It is therefore useless for the purpose of removing bacteria that have already got into the milk. If a cloth is used that has not been properly sterilised since it was last used, bacteria will have bred and multiplied on the cloth, and it will thus be a fertile source of contamination. Where there is any risk of the straining cloth not being properly sterilised after each milking it is better to use a cottonwool disc. These discs are quite cheap; a box containing 100 costs about half-a-crown. Only one is required at each milking, and after use it can be thrown away. Twenty of the competitors used these cottonwool discs. Before they are thrown away they should be examined by the employer or the head cowman; the quantity of dirt strained out of the milk and visible on the strainer is an excellent guide as to the quality of the work being done in the cowsheds.

Bacteria multiply most readily under warm conditions, and the quicker the milk can be cooled after it comes from the cow, and the lower the temperature to which it can be cooled and kept cool, the more slowly will such bacteria as succeed in getting into the milk propagate themselves and increase in numbers. Efficient cooling is, therefore, an important factor in keeping down the bacterial content of the milk.

The principles underlying the production of clean milk are well set out in a poster issued by the National Institute for Research in Dairying and the Ministry of Agriculture and other bodies. It reads as follows:—

CLEAN MILK PRODUCTION.

1. THE COW MUST BE HEALTHY.
2. The Shed must be Clean, well Lighted and Ventilated. The Surroundings also should be clean.
3. Any operation likely to produce Dust just before or during Milking must be avoided.
4. THE COW MUST BE CLEAN. Washing with water gives the best result.
5. After washing, the udder and teats must be wiped with a CLEAN damp cloth.

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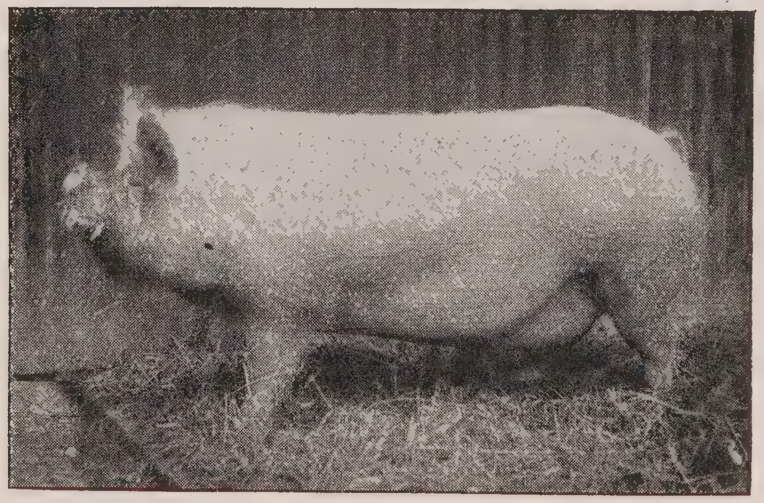
6. The Milker's Hands and Clothes must be CLEAN. The milking stool must also be CLEAN.
7. The Milk Pail should have as small an opening as can be used.
8. The first stream of milk from each teat should be rejected and the practice of wet-handed milking should be avoided.
9. Milk should be removed from the cowshed immediately after milking, and strained.
10. Milk should be handled in a CLEAN, airy, well-lighted shed kept solely for the purpose.
11. MILK MUST BE COOLED. Cool to 50° F. where possible, otherwise to the lowest temperature obtainable.
12. Milk should be kept as cool as possible in closed vessels during storage and transit.
13. Milk utensils, including the cooler, should be rinsed with cold water immediately after use.
14. After rinsing, the utensils should be thoroughly washed and scrubbed with hot water to which soda has been added.
15. After washing rinse utensils in Clean water and Sterilise by steam.
16. Sterilisation depends entirely on heating the utensils to a sufficiently high temperature for a sufficient period of time. SCALDING WILL NOT STERILISE.
17. Sterilized utensils must be protected from contamination until required.
18. Straining cloths, and udder cloths and everything that comes either directly or indirectly in contact with the milk, must be washed and sterilised after each milking.

What will it cost the farmer to carry out the above suggestions? The only operation that is difficult and may be costly is the thorough sterilisation of the dairy utensils, but even this difficulty can be overcome very cheaply by means of a home-made sterilising plant such as the one described in Mr. Procter's report on pages — to —. Twelve of the competitors, including the first three prize-winners, devised a method of steaming their utensils, and six of them obtained diplomas. They were Herds Nos. 2, 8, 10, 12, 15, 18, 22, 29, 32, 39, 46 and 50. The steaming of each churn or bucket should be continued, if complete sterilisation is to be assured, for at least one minute after the coolest part of the utensil, i.e., the lowermost rim or the lip, has become unbearably hot to the fingers, presuming that the water generating the steam is vigorously boiling. The additional cost of following out the above suggestions should not, in the writer's opinion, exceed twopence per gallon, i.e., half-penny per quart of milk. In Reading farmers get threepence per gallon extra for Grade A (Tuberculin-tested) milk, and the retailer sells it at fourpence above the price per gallon of ordinary milk—thus charging a penny per gallon for bottles and bottling.

The results of each sample of milk examined and the marks that were awarded follow :—

Skeynes Herd of Middle White Pigs.



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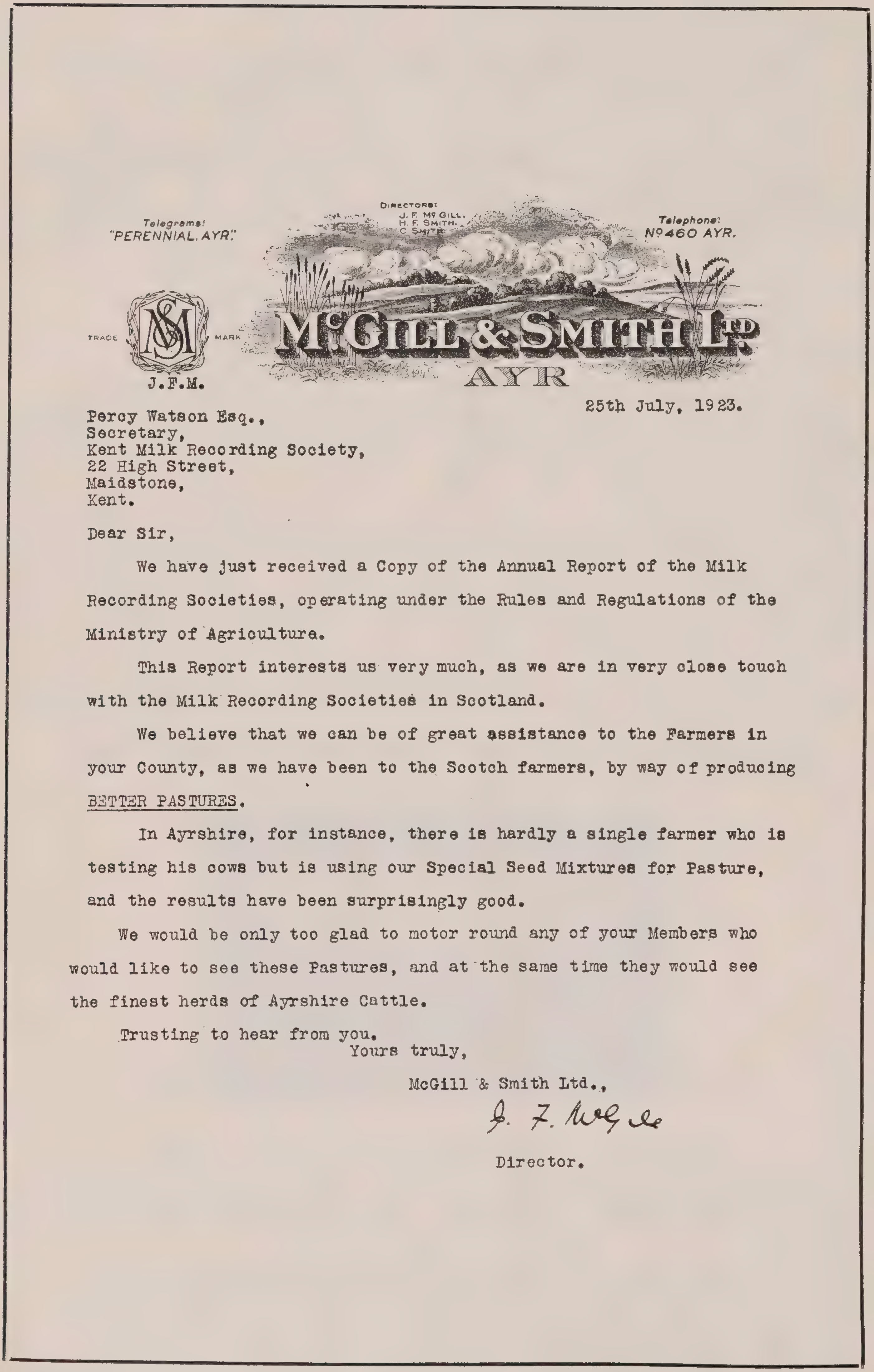

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25th July, 1923.

Percy Watson Esq.,
Secretary,
Kent Milk Recording Society,
22 High Street,
Maidstone,
Kent.

Dear Sir,

We have just received a Copy of the Annual Report of the Milk Recording Societies, operating under the Rules and Regulations of the Ministry of Agriculture.

This Report interests us very much, as we are in very close touch with the Milk Recording Societies in Scotland.

We believe that we can be of great assistance to the Farmers in your County, as we have been to the Scotch farmers, by way of producing BETTER PASTURES.

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Trusting to hear from you.

Yours truly,

McGill & Smith Ltd.,

J. F. McGill

Director.

Table I.—Results of First Samples. Result of Second Samples. Result of Third Samples.

Index No. of Herd	Bacteria per c.c. of Milk.	Coliform Organisms present in	Marks for Keeping Properties (max. 16).	Bacteria per c.c. of Milk.	Coliform Organisms present in	Marks for Keeping Properties (max. 16).	Bacteria per c.c. of Milk.	Coliform Organisms present in	Marks for Keeping Properties (max. 16).
1	380,000	1/100	8	207,000	1/1000	8	580,000	1/1000	8
2	6,300	1 c.c.	11	350	absent	11	1,010	1 c.c.	10
3	91,000	absent	8	270,000	absent	9	114,000	1 c.c.	6
4	5,100,000	1/1000	6	430,000	1/1000	8	440,000	1/1000	6
5	1,270,000	1/1000	6	47,000	1/10	10	68,000	1/1000	8
6	1,320,000	1/1000	6	67,000	1/1000	10	78,000	1/100	8
7	730,000	1/1000	6	310,000	1/1000	7	173,000	1/1000	8
8	130,000	absent	12	7,700	absent	8	360	absent	12
9	950,000	1/1000	10	96,000	1/100	10	32,000	1/1000	7
10	3,150,000	1/1000	8	266,000	absent	10	75,000	absent	10
11	21,900,000	1/1000	6	790,000	1/1000	8	7,100	1/100	8
12	1,420,000	1/1000	8	990,000	1/1000	8	92,000	1/1000	8
13	170,000	absent	8	197,000	absent	10	4,000	1 c.c.	10
14	8,900	1/10	10	34,100	1/10	9	17,400	1/100	11
15	19,800	absent	8	11,300	absent	8	50,000	absent	10
16	8,700	1/10	8	106,000	1/10	6	2,490,000	1/1000	6
17	13,200	absent	8	9,700	1/100	9	44,000	1/10	12
18	25,200	1/100	8	10,300	1/10	8	36,200	1/1000	10
19	400,000	1/1000	8	92,000	1/1000	8	3,640,000	1/1000	6
20	25,100	1/10	8	67,000	1/10	7	54,000	1/1000	6
21	2,300	1/10	8	73,000	1/1000	6	145,000	1/100	10
22	3,900	1/10	12	3,010	absent	12	39,000	absent	12
23	153,000	1/1000	10	142,000	1/1000	8	5,900,000	1/1000	8
24	15,700	1/10	8	186,000	1/10	8	132,000	1/100	10
25	3,200	absent	10	7,600	1 c.c.	10	7,500	absent	12
26	9,200	1/100	8	15,900	1 c.c.	9	35,700	absent	10
27	48,000	1/1000	8	109,000	1/1000	8	341,000	1/1000	9
28	273,000	1/1000	6	1,980,000	absent	8	443,000	1/1000	10
29	403,000	1/100	6	3,160,000	1/1000	8	1,250,000	1/1000	6
30	20,300	1/10	8	69,000	1/1000	7	206,000	1/100	10
31	4,300,000	1/1000	6	220,000	1/1000	8	51,000	1/100	8
32	17,600	1/1000	6	61,000	1 c.c.	8	395,000	absent	6
33	700,000	absent	8	211,000	1/100	8	92,000	1/100	6
34	460,000	1/1000	6	3,110,000	1 c.c.	6	9,300,000	1/1000	6
35	11,700	absent	8	30,000	1/100	10	1,680	absent	9
36	3,600	1 c.c.	8	1,510	1/10	10	7,500	absent	10
37	10,000	1 c.c.	8	191,000	absent	10	47,000	1/10	9
38	82,000	1/100	8	401,000	absent	8	84,000	absent	9
39	1,840,000	1/1000	10	104,000	1/100	9	61,000	1/100	6
40	104,000	1/10	8	1,390,000	1/1000	9	565,000	1/10	10
41	66,000	absent	10	9,400	1/100	10	28,100	1 c.c.	12
42	6,100	1/1000	9	6,700	1 c.c.	9	79,000	1/10	8
43	11,600	1/10	13	12,300	1 c.c.	12	31,000	1 c.c.	13
44	3,000	1 c.c.	9	32,800	1/10	10	8,800	absent	13
45	39,700	absent	10	49,000	1/10	8	57,000	absent	10
46	143,000	absent	10	5,500	1 c.c.	12	29,200	absent	10
47	27,500	1/100	6	73,000	absent	6	550,000	1 c.c.	8
48	19,300	1/1000	8	480,000	1/100	10	102,000	absent	10
49	12,100	1/10	10	20,300	1/1000	11	54,000	1/100	10
50	60,000	1/100	10	21,000	1/10	8	400,000	1/1000	10
51	101,000	1/100	10	42,000	absent	10	96,000	1/10	12
52	3,600	absent	10	14,000	absent	10	13,100	absent	12
53	112,000	1/100	10	109,000	1 c.c.	8	44,300	1 c.c.	10

Table II.

	Results of 4th Samples.			Results of 5th Samples.			Results of 6th Samples.		
Index No. of Herd.	Bacteria per c.c. of Milk.	Coliform Organisims present in	Marks for Keeping Properties (max. 16).	Bacteria per c.c. of Milk	Coliform Organisms present in	Marks for Keeping Properties (max. 16).	Bacteria per c.c. of Milk.	Coliform Organisms present in	Marks for Keeping Properties (max. 16).
1	111,000	1/1000	10	2,860,000	1/1000	6	890,000	1/1000	12
2	350	absent	12	910	absent	16	640	absent	16
3	27,300	1 c.c.	10	13,100	1 c.c.	12	950,000	1/100	6
4	50,000	1/1000	10	7,330,000	1/1000	6	1,320,000	1/1000	8
5	103,000	1/10	8	5,610,000	1/1000	6	2,760,000	1/1000	8
6	7,000	1 c.c.	10	1,130,000	1/1000	6	4,390,000	1/1000	10
7	18,300	1/10	10	9,700	absent	10	360,000	absent	8
8	470	absent	16	470	1 c.c.	16	570	absent	16
9	21,000	absent	10	398,000	1/1000	6	18,300	absent	12
10	84,000	1/10	8	390,000	1/1000	6	14,900	1 c.c.	12
11	75,000	1/10	9	450,000	1/1000	6	76,000	1/100	10
12	21,300	absent	10	103,000	1/10	10	7,700	1 c.c.	14
13	2,160	1 c.c.	12	121,000	1 c.c.	10	3,610	absent	14
14	14,900	1/100	12	2,370	1/1000	12	32,600	1/1000	10
15	8,400	1 c.c.	12	1,190	absent	16	5,600	absent	16
16	16,900	1/10	10	2,420	1 c.c.	12	111,000	absent	8
17	9,600	absent	10	12,500	absent	14	980,000	1/100	12
18	15,200	1/100	10	9,300	1/100	12	124,000	1/1000	12
19	140,000	1/100	10	477,000	1/100	10	459,000	1/10	10
20	39,300	1 c.c.	10	25,900	absent	13	65,000	1/1000	12
21	25,900	1/100	8	37,800	1/10	10	5,600,000	1/1000	6
22	990	absent	14	2,390	absent	16	3,920	absent	15
23	1,580,000	1/1000	8	87,000	1/100	10	71,000	1/1000	12
24	126,000	1/10	10	170,000	1/10	10	81,000	1/10	10
25	6,100	absent	12	2,500	absent	16	3,540	absent	15
26	25,600	1 c.c.	10	13,800	1 c.c.	11	38,500	1 c.c.	12
27	383,000	1/1000	8	443,000	1/1000	10	328,000	1/1000	10
28	298,000	1/100	10	92,000	absent	15	990	absent	16
29	77,000	1/100	8	7,600,000	1/1000	6	278,000	1/1000	10
30	47,000	absent	10	32,600	1/10	12	28,700	1 c.c.	11
31	9,400	1/100	10	26,600	1/100	10	4,970	1/100	14
32	1,130	1 c.c.	10	1,270	absent	16	34,100	1 c.c.	12
33	14,900	absent	10	11,600	1 c.c.	10	11,500	absent	10
34	95,000	1/100	8	418,000	1/1000	6	29,100	1/100	10
35	640	absent	12	2,280	1/100	14	550	absent	11
36	3,040	absent	12	1,110	absent	12	2,230	absent	14
37	4,600	absent	12	66,000	1 c.c.	12	7,400	absent	14
38	18,200	absent	8	1,280,000	absent	8	24,200	1/10	12
39	237,000	1/10	10	68,000	absent	10	78,000	1 c.c.	10
40	9,100	1 c.c.	10	11,200	1/100	12	5,400	1 c.c.	14
41	24,100	1/1000	12	534,000	1/10	11	631,000	absent	16
42	35,600	1/100	12	20,000	1/100	9	147,000	1/1000	8
43	14,100	1/100	13	11,600	1/10	16	6,400	absent	12
44	2,820	absent	12	16,300	1/10	13	13,100	1/10	14
45	159,000	1/10	9	6,340,000	1/100	6	97,000	1/10	10
46	9,600	1/10	14	680,000	1 c.c.	14	4,260	1 c.c.	16
47	1,850,000	1/1000	8	2,530,000	1/1000	6	7,500,000	1/1000	6
48	106,000	1/10	8	5,360,000	absent	6	117,000	1/1000	10
49	28,800	1/1000	12	1,260,000	1/1000	9	133,000	1 c.c.	14
50	104,000	1/1000	11	36,000	1/1000	14	3,480	1 c.c.	14
51	43,600	1/100	12	173,000	1/100	15	20,100	1/10	12
52	14,300	1 c.c.	12	40,100	absent	15	10,100	absent	14
53	299,000	1/1000	12	540,000	1 c.c.	13	23,400	1/100	14

Table III. Results 1st Surprise Sample. Results 2nd Surprise Sample. Scores for Total Counts B. Coli. & Keeping Properties.

Index No. of Herd.	Bacteria per c.c. of Milk.	Coliform Organisms present in	Marks for Keeping Properties (max. 16)	Bacteria per c.c. of Milk.	Coliform Organisms present in	Marks for Keeping Properties (max. 16)	ROUND						SURPRISE SAMPLES		Total (max. 928)
							1	2	3	4	5	6	1	2	
1	93,000	1/1000	6				28	23	16	30	6	17	1 x 2		142
2	620	absent	9				81	111	93	112	111	114	107 x 2		836
3	234,000	absent	5	355,000	1/100	9	71	62	56	70	77	21	60	32	449
4	1,670,000	1/1000	4				6	18	16	35	6	11	5 x 2		102
5	135,000	1/10	8	1,700,000	1 c.c.	7	9	58	31	48	6	8	46	38	244
6	50,900	1/10	8	4,120,000	1/1000	6	9	33	41	80	9	10	53	6	241
7	9,300	1 c.c.	6	71,000	1 c.c.	8	14	20	26	63	88	61	74	61	407
8	6,300	absent	12	140	absent	16	70	88	112	116	106	114	92	116	814
9	25,200	1/10	7	4,790	1 c.c.	11	15	40	37	83	16	85	57	84	417
10	48,000	1/10	4	5,400	absent	14	8	63	73	51	16	77	52	97	437
11	31,000	1/1000	6	76,000	1/1000	8	6	13	58	52	16	43	36	31	255
12	11,300,000	1/1000	8	3,700	absent	12	11	13	31	83	50	84	8	97	377
13	3,460	absent	8	500	absent	14	66	65	85	90	60	99	93	114	672
14	61,000	1 c.c.	10	4,800	absent	12	68	57	54	57	60	38	65	95	494
15	45,000	absent	6	121,000	absent	11	81	86	75	80	109	99	74	71	675
16	65,000	1/1000	8	31,600	1 c.c.	6	66	46	6	63	90	68	31	66	436
17	153,000	absent	8				83	57	60	88	89	27	66 x 2		536
18	36,300	1/1000	8	12,600	1/100	12	48	66	38	55	60	32	36	57	392
19	57,000	1 c.c.	5	6,400,000	1/10	6	18	31	6	38	30	40	60	16	239
20	119,000	1/1000	4	960,000	1/1000	8	58	50	31	68	83	35	24	13	362
21	101,000	absent	6				76	29	38	48	58	6	66 x 2		387
22	99,000	absent	13	680	absent	16	77	97	80	109	104	100	73	114	754
23	255,000	1/1000	8				28	26	8	9	43	35	21 x 2		191
24	630,000	1 c.c.	8				63	46	38	48	48	53	46 x 2		388
25	1,530	1/1000	12	880	absent	14	95	80	92	92	104	100	72	109	744
26	13,600	absent	10				56	74	78	70	76	70	85 x 2		594
27	410,000	1/1000	8				36	28	22	18	20	23	18 x 2		183
28	16,200	1/1000	9	30,700	absent	8	19	49	20	33	78	111	42	78	430
29	2,540,000	1/1000	6				26	8	9	41	6	23	6 x 2		125
30	69,000	absent	8				61	30	35	78	60	71	71 x 2		477
31	4,400	1 c.c.	8				6	23	43	58	50	67	81 x 2		409
32	330,000	absent	8				39	63	56	93	109	70	61 x 2		552
33	194,000	absent	8	71,000	absent	10	56	33	39	85	78	88	63	73	515
34	750,000	1/1000	6				16	32	6	41	16	50	14 x 2		189
35	132,000	1/100	6	2,990	absent	12	86	50	99	110	72	109	34	100	560
36	1,830	absent	8	2,570	absent	10	83	80	90	97	105	102	98 x 2		753
37	5,400	absent	10				76	65	57	95	65	94	93 x 2		638
38	27,000	absent	8	187,000	absent	8	41	58	72	81	51	62	78	66	509
39	1,090,000	1/100	8	287,000	1/100	12	13	39	41	45	73	63	21	35	330
40	7,400	absent	9				48	12	38	78	60	87	89 x 2		501
41	34,500	absent	10				73	58	72	42	39	64	78 x 2		504
42	19,100	1/10	11				49	79	51	50	52	26	64 x 2		435
43	9,700	absent	14				71	77	73	58	74	92	92 x 2		629
44	4,300	1 c.c.	12				87	58	91	100	66	69	85 x 2		641
45	71,000	absent	10				78	53	75	47	6	50	73 x 2		455
46	28,400	absent	13				68	85	80	72	52	89	83 x 2		612
47	49,000	absent	10				46	69	46	9	6	6	75 x 2		332
48	109,000	absent	10				41	30	70	48	39	30	70 x 2		398
49	99,000	1 c.c.	10				65	44	45	42	12	62	60 x 2		390
50	44,000	absent	10				45	61	20	31	42	89	78 x 2		444
51	18,100	1 c.c.	12				40	78	52	50	43	65	75 x 2		478
52	10,900	absent	13				95	85	87	77	83	92	91 x 2		701
53	268,000	1/1000	8				40	58	68	25	51	57	21 x 2		341

Table IV. Percentage of Butter Fat. Total Scores.

No. of Herd	ROUND						SURPRISE SAMPLES.		Average %	Total marks for bacterial tests (max. 928).	Marks taking 800 as maximum.	Marks for Butter Fat (max. 100).	Marks for Inspections (max. 600)	Total Marks (max. 1,500)	Order of Merit.
	1	2	3	4	5	6	1	2							
1	3.10	3.30	3.33	2.95	2.70	2.80	4.25 x	2	3.34	142	122	37	394	553	48
2	2.55	2.73	2.90	2.90	2.95	2.85	4.70 x	2	3.28	836	721	36	496	1,253	2
3	4.95	4.00	3.98	5.08	(7.30)	(7.08)	5.90	5.20	4.85	449	387	67	397	851	24
4	3.38	2.80	3.00	2.95	2.80	2.63	3.68 x	2	3.12	102	88	32	336	456	51
5	3.65	3.20	3.33	3.08	3.20	2.48	4.78	4.65	3.55	244	210	41	413	664	43
6	3.10	3.20	3.18	3.25	3.08	2.38	5.20	4.23	3.45	241	208	39	392	639	45
7	3.25	3.10	2.83	3.20	4.33	3.20	5.65	4.45	3.75	407	351	45	430	826	28
8	3.50	(6.70)	3.30	3.15	3.15	2.48	4.00	4.23	3.40	814	702	38	518	1,258	1
9	3.28	3.65	3.20	3.78	3.13	3.00	3.88	3.60	3.44	417	359	39	283	681	42
10	3.43	3.08	3.30	3.50	3.08	3.23	5.38	4.18	3.65	437	377	43	377	797	32
11	2.60	3.23	3.73	2.80	2.83	3.15	4.30	3.83	3.31	255	220	36	360	616	46
12	(5.05)	3.50	3.33	2.85	3.15	3.40	3.85	3.78	3.41	377	325	38	364	727	38
13	3.05	3.28	3.18	3.58	3.20	3.35	4.65	4.58	3.61	672	579	42	430	1,051	9
14	3.00	3.88	3.63	3.50	2.30	2.85	3.45	3.90	3.31	494	426	36	413	875	21
15	3.75	2.78	2.40	3.13	3.50	3.35	4.60	3.95	3.43	675	582	39	415	1,036	11
16	4.85	5.50	4.95	5.25	(7.20)	(6.28)	5.88	5.25	5.28	436	376	79	404	859	24
17	3.50	3.05	2.90	2.83	3.33	3.25	4.23 x	2	3.42	536	462	38	421	921	16
18	2.98	3.05	3.08	3.20	3.23	2.83	3.60	3.68	3.21	392	339	34	450	823	29
19	3.88	4.45	3.40	3.85	3.18	3.55	4.25 x	2	3.85	239	206	47	265	518	49
20	3.90	4.28	3.90	3.90	3.50	4.40	5.00	3.90	4.10	362	312	52	363	727	38
21	3.43	3.53	5.60	3.08	3.30	2.95	3.90 x	2	3.71	387	334	44	339	717	40
22	4.03	3.23	2.65	3.58	3.00	2.75	3.75	3.90	3.36	754	650	37	478	1,165	3
23	3.90	3.45	4.68	4.70	3.50	3.23	4.50 x	2	4.06	191	165	51	221	437	53
24	3.70	4.10	4.20	3.98	4.40	3.75	4.05 x	2	4.03	388	334	51	279	664	43
25	4.20	4.25	4.00	(6.43)	3.98	3.40	4.30	4.45	4.08	744	641	52	413	1,106	5
26	3.60	3.05	2.83	3.00	3.25	3.05	3.78 x	2	3.29	594	512	36	354	902	17
27	3.70	3.30	3.35	3.45	3.25	3.28	4.15 x	2	3.58	183	158	42	251	451	52
28	3.65	3.00	2.90	2.80	3.28	3.58	4.28	4.58	3.48	430	371	40	365	776	33
29	2.98	2.95	3.50	3.28	3.25	4.30	3.70 x	2	3.46	125	108	40	347	495	50
30	3.48	3.30	3.45	3.50	3.45	3.53	3.80 x	2	3.54	477	411	41	388	840	26
31	3.50	3.65	3.95	3.40	3.18	3.40	4.00 x	2	3.64	409	353	43	353	749	35
32	4.63	(5.43)	4.38	4.28	4.25	(6.23)	6.00 x	2	4.92	552	476	68	490	1,034	12
33	4.00	4.78	3.98	3.23	3.03	3.20	4.08	4.38	3.84	515	444	47	348	839	27
34	3.30	3.58	3.65	3.80	3.80	3.40	4.35 x	2	3.78	189	163	46	406	615	47
35	3.90	4.80	3.30	(5.35)	3.53	3.85	4.60	4.40	4.05	560	483	51	511	1,045	10
36	3.55	3.58	3.20	3.30	3.05	3.00	4.18	4.25	3.51	753	649	40	411	1,100	6
37	3.28	4.10	3.35	3.40	3.05	2.60	4.45 x	2	3.59	638	550	42	484	1,076	7
38	3.10	2.78	2.98	(4.78)	(4.03)	3.50	3.73	2.95	3.17	509	439	33	419	891	19
39	4.75	4.30	(6.03)	(7.30)	(6.00)	4.85	3.70	3.80	4.28	330	284	56	435	775	34
40	3.68	3.80	3.85	3.68	3.33	3.58	4.70 x	2	3.92	501	432	48	333	813	30
41	3.68	3.40	3.88	3.68	3.28	3.05	4.45 x	2	3.73	504	434	45	394	873	22
42	3.45	3.80	(6.00)	4.05	3.85	4.25	3.93 x	2	3.89	435	375	48	471	894	18
43	3.05	3.68	3.10	3.40	3.15	3.20	4.08 x	2	3.47	629	542	39	447	1,028	14
44	3.35	3.35	3.40	4.00	3.30	4.50	4.65 x	2	3.90	641	553	48	433	1,034	12
45	4.70	(6.15)	4.73	5.10	5.13	5.18	6.13 x	2	5.30	455	392	79	408	879	20
46	4.20	3.40	4.68	3.85	3.58	3.50	4.15 x	2	3.94	612	528	49	485	1,062	8
47	3.95	4.00	3.65	3.55	3.58	3.40	4.45 x	2	3.88	332	286	48	411	745	36
48	3.20	3.80	3.38	3.05	3.05	3.15	4.38 x	2	3.55	398	343	41	351	735	37
49	(6.60)	4.68	4.80	4.85	4.70	4.50	5.63 x	2	4.97	390	336	69	401	806	31
50	4.93	5.25	(9.50)	(9.50)	4.45	4.43	5.10 x	2	4.88	444	383	68	484	935	15
51	3.35	3.88	3.38	3.68	3.63	4.08	3.95 x	2	3.74	478	412	45	413	870	23
52	3.20	3.63	3.00	3.60	4.05	2.60	3.65 x	2	3.42	701	604	38	494	1,136	4
53	3.28	3.10	3.33	3.15	2.90	3.38	4.13 x	2	3.43	341	294	39	370	703	41

Photo by
Fisk-Moore,
Canterbury.

CHILD WELFARE

BY A BUSINESS MAN.

The strongest asset in the Nation's balance-sheet to-day is the properly fed and well cared for baby, and the same remark will apply to-morrow and the day after to-morrow, and the day after that.

Many people say that Baby is a liability—nothing of the sort. Baby's expenses are rightly chargeable against the current account. Whether the income in that account is obtained from either the parents' earnings or the rates or the taxes, or all three, is of no moment, it is a current expense, and when the balance-sheet is made out the Baby is the best asset of the lot. Place your screaming national debt on the liabilities side of the account, and crowds (there must be crowds of 'em) of properly fed, well cared for, happy, smiling, crooney babies on the asset side, and every Chancellor of the Exchequer, born or unborn, may sleep easy.

One of the worst investments this nation ever made was the dissipation of millions in smoke on the continent. There are those who speak to the contrary, but look at it which way you will, the whole affair was and is and ever shall be a ghastly reflection on civilisation, and what is left is dead men and women and wrecked men and women and a bad debt known as German Reparations.

No, our strongest asset is properly fed and well cared for babies. Babies every time. Babies are the Nation's securities. Gilt edged? Some, not all. There's a lot to be done. There's an awakening. Child welfare. The Nation's women and not a few men are alive to the situation. In every town, in every village, you hear of it.

The potential power in every child is simply enormous. Let the Nation, in council and out of it, invest more money in that power—build it up, train it up, let the nation realise that therein lies an incalculable energy.

Those of us who approach the frayed edges of Anno Domini, with rheumaticky twinges and/or other affections, must think sometimes of the why and wherefore of everything. The answer is " Man must progress in his dominion over Nature "—why hold progress up by a wrong outlook? A woman's intuition is proverbial. Therefore, business men, be guided by the intuition of your wives; when they importune you for subscriptions towards " Child Welfare "—pay up cheerfully and add thereunto a prize for the Baby Show.

When you become a member of the County Council, you can then place C.C. after your name, which stands for " Care of the Children "; don't forget it, and don't forget to vote in favour of Child Welfare. If it increases the rates, you will be criticised, but don't trouble; your critics have a wrong outlook!

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REPORT OF THE SURPRISE INSPECTIONS.

By T. W. McDougall Porter, M.C., N.D.A., Inspecting Judge.

The 53 herds, averaging 27 cows apiece, were arranged in four groups according to the locality, and it was agreed that the inspections were not to begin until after the farmer had sent in his first sample of milk. This delayed the commencement of the surprise inspections until February 1st, but by the beginning of April all the herds had received a visit. For these inspections the time of milking was known, and where possible I tried to arrange to enter the farm about half an hour earlier, this enabling me to thoroughly inspect the utensils before work commenced. I then remained in the cowsheds until milking was finished, when a sample of milk was taken.

During these visits I made it my duty to point out not only to the farmer, but also to the men, where I considered their methods were at fault and how they could be improved. The marks awarded for these inspections were published fortnightly, together with my criticisms of each herd, and it is very gratifying to know that a large number of the competitors adopted my advice. Unfortunately it was not possible to inspect all the 53 herds a second time, and only 24 received a second visit, while one of these, the winning herd, was inspected a third time. The score card used for these inspections is shown on page 15.

Health of Animals.

The health of the animals in the Competition was very good, and in very few cases were marks deducted under this heading. Two cases of udder trouble were detected by examining the strainer after milking, pus being found, which proved after examination to contain streptococci infection, but no trace of tubercle bacilli. In the first case it was clearly seen that the pus was from a cow in the early stages of garget, and probably this was the first day that it had appeared on the strainer. At the second farm, however, this was not the case, for I learnt on enquiry that it had been noticed for a week by the man who did the cleaning of the utensils, but he had not informed his employer. Both those cows were located the following morning, when the milk from each cow in the herd was separately strained. If a little cold water is run through the strainer after milking is finished any trouble of this kind can soon be detected and should be looked for daily.

Food and Water.

At several farms water troughs were provided in the cowshed, and where this was done they were in most instances kept clean. Cases of tainted water were, however, noticed during the second inspection, when the weather was much warmer. Some of the tanks in the yards were also not wholesome at this time.

Construction of Cowsheds.

It is often considered that to produce clean milk one must have good modern buildings. This is far from correct. Good buildings certainly make the work easier, but provided there is a good floor and sufficient ventilation and light, the construction of the buildings plays a very small part in the production of clean milk. Captain Hatfeild (Herd No. 8), the winner of the Competition, certainly has a well-built, modern cowshed, but there is no milkroom and all the milk has to be cooled in the cowhouse, which cannot be considered an ideal arrangement. Mr. Pearson (Herd No. 36), who obtains fifth prize, has a cowhouse in which many people would say it was impossible to produce clean milk. Here twelve cows are milked in a portion of an old tithe barn, which is only divided by wooden rails from the rest of the building, where hay, straw and other fodder are kept. The barn is not well lighted, but ventilation is ample owing to the cracks and holes in the walls and roof. Mr. Howie (Herd No. 25), who obtains fourth prize, has two cowsheds far from ideal, and when I visited the farm for the first time Mr. Howie told me that he was afraid the Sanitary Inspector might condemn his buildings unless alterations were made. The flooring was certainly not good, while the airspace and provision for daylight were inadequate.

Construction of Milkroom.

The milkrooms varied greatly on the different farms, from little sheds that were only large enough to hold a cooler and a churn to some very roomy buildings. The ventilation in many of these could be greatly improved, and taking the majority there were not sufficient windows to allow the building being well lighted when the door was closed. It is not always an advantage to keep the door wide open during the daytime, as in dry weather the dust that blows across the average farmyard is considerable.

The utensils were usually kept in the milkroom, where they either stand on a wooden rack or table. It would be an advantage where new racks are to be provided if they were made from iron piping, as such piping is much easier to keep clean and is not easily tainted when wet buckets are placed on it to drain. On a large number of farms the copper was located in the milkroom. This should be avoided where possible, as the milkroom can be kept much cleaner if all the utensils are washed in a separate part of the building.

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Construction of Utensils.

The milk buckets in use on many farms left something to be desired. In several cases galvanised-iron pails were used. Farmers had bought this type with the idea of economy, but pails of this material are very much more difficult to clean and are seldom found in a satisfactory condition. Cases were also found where the buckets had a seam down the side, whilst many milk buckets had crevices along the seams, and in some cases at the junction where the handle joins the bucket. Cleaning would be much easier if only well-tinned utensils were used, with the seams flushed smooth with solder and without any corners or crevices.

The cooler on many farms presented great difficulties. Some were found in such a dented and damaged condition that it was practically impossible to keep them clean. Many of them had been repeatedly repaired by solder, and when this is done locally it is seldom that a man can be found that will leave a smooth surface to his work.

No coolers were found in the Competition fitted with metal covers. These covers fit on each side of the cooler and protect the milk from dust while it is being cooled. Dust is also very liable to fall from the man's sleeve when the milk is being poured into the top tank.

At the beginning of the Competition many farmers were straining their milk through butter muslin. This is not an efficient strainer even when several thicknesses are used. A straining cloth is far more effective, but this has to be thoroughly scalded and new ones frequently used, otherwise bad results will be obtained. If there is any difficulty about sterilising the strainers a cottonwool disc should be used instead. They are made in various sizes and should be thrown away after each milking.

Equipment for Sterilising.

The cleaning and sterilising equipment on some farms was not good. In many cases it was only with difficulty that boiling water could be obtained. Since the commencement of the Competition several farms have installed a copper steamer over which the buckets, churns and cooler can be sterilised. An ordinary copper can be adapted as a steamer for a few shillings (see page 54).

At Mr. W. K. Brown's farm at Beckenham (Herd No. 46) gas was laid on in the buildings. There steaming was performed by means of a gas ring on which was placed a Blood's Whistling Kettle. The whistling end of the spout was removed and the kettle was placed under a small wooden platform which had a hole in the centre through which the spout protruded. When the water boiled the churn and buckets were in turn placed on the platform and steamed. After steaming these, the cooler was sterilised by placing it on the platform and covering it with a wooden box. When this had been steamed sufficiently the gas was turned out and the cooler left under the box until required for use.

Three farms had pressure boiler sterilising plants, but only one of these had a tank in which to steam the cooler and small equipment. On this farm the churns were steamed by placing them over the steam jet, while the buckets, cooler and other small utensils were steamed by placing them in the tank, where they remained until they were wanted for use.

At Mr. Jenkin's farm (Herd No. 22) the steaming was done by means of a "Simple Steam Steriliser," which consists of a small tank and steam pipe heated by two small primus stoves. Such a steriliser could be made locally at small cost by a local blacksmith, and could be used successfully for any herds of not more than 20 cows.

Cleanliness of the Cows, Washing and Clipping of the Udders.

On most farms the cows were found in a very clean condition. Daily grooming was practised and the udders washed before milking.

A large number of farmers had the cows' udders clipped, and in some cases this was done by singeing. The taking off of the long hair is a very great help towards keeping the udders clean. Some farmers object to this practice on the ground that it is liable to cause colds in the udders, but where the clipping was adopted I heard nothing but praise. I understand that in the Reading district this has been done for several years on a number of farms without any bad results. In Kent one large dairy farmer has for the last two years used the singeing lamp. The hair of the udder grows quickly and requires to be cut every 5-10 weeks.

The washing of udders in many cases was very thoroughly carried out, but on other farms, though washing was practised, the udders were sometimes left dirty, especially on the left side and fore part.

On many farms the cows were groomed once per day, and before milking the hindquarters and flanks were washed down with a brush and finally wiped with a cloth. It was often noticed that the flank of the cow above the udder was neglected. The milker usually rests his head here, and the mere act of brushing and damping that part prevents a large amount of hair and dirt falling into the bucket. This is especially necessary when the open milking pail is used. When the tail is dirty the switch of the tail should be dipped in a bucket of water and swirled round in it and then swished out. On some farms it was the practice to clean down all the cows before any milking commenced, but this often necessitated some cows being washed again owing to their lying down in their droppings, and for this reason on some farms the milkers cleaned each cow immediately before they were milked. On one farm the washing and cleaning was very effectively done by a boy of 14 years, who washed the flanks and udders of each cow in front of the milkers.

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After washing, the udders should either be dried with a clean cloth or, where a sponge is used for washing, with the squeezed-out sponge. On one farm where the washing was very thorough the writer noticed the udders being dried with a very sour-smelling cloth. This should be avoided by thoroughly sterilising all the cloths.

The water used for washing should be frequently changed. A dirty cow will require a bucket to herself, while the next five or six may hardly dirty the water at all. Disinfectants were sometimes used in the water, but should not be used stronger than the strength recommended by the makers, if they are used at all.

On some farms where the grooming was very thorough washing was not done—the udder being wiped with a dry cloth. The samples of milk proved this to be insufficient. For washing the udders cold or tepid water should be used. Warm water is liable to cause chills.

At my second visit to one herd I found that the cows' udders were not being washed before milking. On enquiring the reason I was told by the cowman that he did not now consider that it was necessary to wash the udders as the cows were turned out to grass. The result was that a bad sample of milk was submitted after several fairly good ones had been sent in. At two farms a milking machine was used. The amount of visible dirt that gains entrance to the bucket is lessened when a machine is used, but when the stripping is done by hand, unless the udder has been thoroughly cleansed, the milk obtained will contain a very large proportion of dust, hair and dirt, and will largely increase the numbers of bacteria in the milk. The tubing is difficult to sterilise, and may provide a breeding-ground for objectionable bacteria, even in spite of soaking in disinfectants.

Cleanliness of Cowshed.

On the majority of farms the cowsheds were kept very clean. The manure was regularly removed and on several farms the lower portion of the walls was frequently whitewashed. By the beginning of the spring some of the cowsheds had gradually become very dusty, which had an adverse effect on the milk. Dust plays a very important part in the production of clean milk, and for this reason more attention should have been paid to the roofs, rafters and ledges of the walls. The windows were often a neglected portion of the building. Dirty windows not only prevent the entrance of the maximum amount of sunlight, but they are often a great collecting-ground for cobwebs and dust.

On several farms not sufficient care was taken to prevent the raising of dust during milking. In some cases long hay was fed from racks, the dust from which could easily be seen floating about in the air. Cows were also sometimes brushed down just before milking, and in one or two cases hay and straw were seen to be brought into the buildings at that time.

In order to lay the dust the air of the buildings at several farms was sprayed with water just before milking. At one farm the spraying was done by means of a small greenhouse syringe, at others with a whitewash sprayer or knapsack sprayer. Spraying of this nature certainly lays the dust and is an aid to the production of a clean sample of milk. If some disinfectant is added to the water it will help to keep flies away from the cowshed in the hot summer months. Care should be taken when this is done in a low-roofed building not to hit the roof, as it is apt to chip off the whitewash and disturb the dust. Usually the floor was kept clean. Where the main floor was of a non-slippery nature it was often wetted by throwing buckets of water over it just before milking. This prevents the dust from rising and keeps the cowshed cool.

Where the milk is weighed in the cowshed more care might sometimes be taken to see that the spring balance is clean. On three farms dust was seen to descend from the balance each time that the milk was poured into the weighing bucket.

On some farms whilst milking was in progress all the doors of the cowshed and milkroom were kept closed, and in some cases many of the windows also, while at other farms they were kept open. The reason for this closing is to prevent any dust from blowing into the cowshed while milking is going on or when milk is running over the cooler. Equally good samples have been obtained from farms where both these methods are adopted, and I think it is a question to be decided by the farmer himself. On dry days, when the cowshed and dairy is situated in a dusty yard and the wind is blowing towards these buildings, it seems advisable that precautions should be taken to prevent any chance of this dust, which must often be contaminated with dung, from gaining entrance to the milk.

Cleanliness of Milkroom.

The milkroom was well kept in most cases, but improvements could be effected on some farms. A milkroom should be used solely for handling and storing milk and milk utensils, and should not contain collections of medicine bottles, tins and a great variety of coats and clothing.

Cleanliness of Utensils.

The utensils play a very important part in the production of clean mlik. When milk is cooled every drop that is produced runs over the cooler, and if the latter has not been thoroughly sterilised every drop may be contaminated. Of the first 10 herds that I inspected where cooling was practised, five were found with dirty coolers. The buckets and churns were also not as they should have been. After the first fortnightly report was issued to competitors the cleanliness of the utensils gradually improved, and by the end of the Competition they were well cared for. There are, however, several matters that do not seem to be thoroughly understood on many farms. The chief one, perhaps, is that although a bucket looks clean it is not necessarily so. Bacteria are not visible to the naked eye, therefore we don't know whether they are present or not, but unless the utensils have been thoroughly washed and afterwards steamed for two or three minutes, or thoroughly scalded with water actually boiling, we can rest assured that the bacteria are there and not killed.

Immediately after use the cooler and utensils should be rinsed thoroughly in cold water. If this is done washing will be made more easy, and can now be done when convenient. The utensils should then be thoroughly scrubbed with hot water and soda and afterwards rinsed in cold water. They are now ready for steaming. If steam is not available the utensils should be immersed in boiling water for two or three minutes, or in the case of utensils, such as a cooler or churn, which cannot be placed in an ordinary copper, boiling water should be placed over or into them until they are too hot to be touched with the hand. If steam is available all utensils should be steamed for at least three minutes over a steam jet, or in a sterilising tank. After steaming the utensils should be inverted on a rack in a clean place to drain and dry, and should not be touched with a cloth. It is a practice on some farms to rinse all the utensils that have previously been steamed in cold water immediately before use. As this is not done with sterilised water, it is undoing a great deal of good that was performed by the steaming. For a similar reason utensils should never be wiped dry after they have been sterilised; they should be stood upside down to drain. Bacteria cannot develop on a dry surface, and unless there are visible signs of dust this rinsing with cold water is unnecessary.

The taps of delivery churns were often found neglected. They are very important, and should be taken off after use and thoroughly sterilised.

Where straining cloths are used they require just as careful cleansing, and I am quite certain that several farms would have done better in this competition had more attention been paid to these, or if they had discarded them and used a cotton wool disc strainer, which would be thrown away after use.

On a large number of farms there was an agreement with the wholesaler to return clean churns. Several farmers in the competition naturally took it for granted that these churns were thoroughly sterilised. However, I know of two or three cases where after several bad samples were submitted, the churns were steamed on the farm with a copper steamer, and the result of the next samples was very different.

Where a milking machine is used, thorough cleansing is of greater importance than when only hand milking is performed. All parts of the machine that come in contact with the milk must be thoroughly cleansed, and to do this is often exceedingly difficult when much rubber tubing is employed.

Protection from Contamination.

Where a sterilising tank is used the best means of keeping utensils free from contamination is to leave them in it after steaming until required, but this is not possible on the majority of farms except in the case of the cooler and other small vessels, when a copper steamer or some other steamer is used in conjunction with a box. The next best place is in a well lighted and ventilated dairy or milk room, where they should be free from dust. It is for this reason that the milk room should be kept perfectly clean. The utensils should stand on a rack. On many farms the dairy utensils are kept on a rack out of doors in the sun. This is not a drawback provided they are kept free from dust and other contamination, and it is certainly better than keeping them in a badly lighted and ventilated building, especially if it is so small that the buckets have to be placed on top of each other. Where there is no milk room the utensils should be kept in the open as much as possible and only returned to the cow house when required for use.

Cleanliness and Methods of Milkers.

During the competition the methods adopted by the milkers were usually very good. Much care was taken by the milkers to wash their hands frequently. In some cases disinfectant was used in the water. In many cases the men did their utmost to milk with dry or fairly dry hands, a method which requires a great deal of practice. On the other hand, the methods adopted by some men were bad. At the commencement of the competition few milkers discarded the first few drops of milk. Dirt is apt to get into the end of the teat, and the first two squirts of milk will bring this down. Another reason for discarding this milk is that stale milk from the previous milking may have lodged there, and it will contain a large number of bacteria.

Milking stools at this time were also a sourse of contamination, but after the first few weeks they were kept very clean. If a man has taken the trouble to wash his hands and the cows' udder and then picks up a dirty milking stool, he immediately undoes all the benefits that should have been obtained from washing.

In 28 cases the milkers were provided with milking suits, and in eight cases with milking suits and caps. These were washed once, or in some cases twice, a week. When these suits were used it was noticed that the men took a great pride in their personal cleanliness, which was reflected in the general cleanliness of the cows and buildings.

Use of Covered Milking Pails.

The common type of milking pail is easy to milk into, as it is wide at the top, but this advantage is counterbalanced by the fact that all dirt and hair which falls from the udder must fall into the bucket. Several types of covered or hooded pails have been introduced to lessen this defect. Several men in the competition told me that the first day or so that they used these buckets they found them extremely difficult to milk into, but they soon became accustomed to their use, and found them as easy to use as the open pail. With a covered bucket there is a slight loss of milk at milking time from part of the stream of milk failing to enter the bucket, but provided the opening is a reasonable size the loss is very small. The covered bucket was used on 10 out of the 53 competing farms.

Treatment of Milk after Milking.

The treatment of the milk after milking varied greatly on the different farms. In some cases it was left in the cow shed until milking was finished, but in the majority of cases it was removed and cooled at once. The reason for milk being left in the cow shed was usually that the distance between the cow house and milk room was appreciable, but this difficulty was overcome in many cases in a very cheap and practical way.

At one farm two small cupboards about 2 ft. 6 in. high were built outside the cow house. These cupboards were sufficiently large to hold four buckets. The doors were made of wire netting and the floor was of concrete. As soon as a cow was milked the milk was poured into a large bucket in the cupboard, where it remained until two buckets were ready to be carried to the cooler. This arrangement could be improved upon by lining the wire netting with canvas to protect the milk from dust, or by placing lids on the pails. Another competitor employed four gallon churns with a hinged lid in which the milk was poured. These churns stood outside the door and were carried to the cooler when filled. At Mr. Hollands' farm (Herd No. 13) open buckets were placed outside the sheds. Over each of these buckets was placed a saucepan lid, which prevented any dust from contaminating the milk while it was standing in the yard and while it was being carried to the dairy. The practice of leaving the milk standing in the cow shed should be discouraged. Not only is there a greater chance of contamination, but when milk is left in buckets on the ground there is a greater risk of it getting splashed with dung or urine.

At Captain Hatfeild's farm (Herd No. 8) the milk is cooled in the cow shed, where it remains until the end of milking, and is then taken to the dairy. This is far from being an ideal arrangement, but owing to the thorough cleanliness of the buildings it proved no serious handicap, as was shown by the excellent samples of milk obtained. It is, however, an exceptional case. The act of cooling the milk is a great advantage, because effective cooling greatly lessens the loss of milk by souring and prevents the growth of organisms, which may have gained entrance to the milk. Nevertheless, provided the milk has been produced under exceptionally clean conditions, very good samples of milk that keep well without cooling can be obtained, as was proved by Mr. Hollands (No. 13), who obtained 9th place in the competition. If, however, the conditions have not been exceptionally good, not to cool is a great drawback.

On one farm where the milk is sold retail the milk is not cooled in winter for the reason that the public in that district prefer to receive the milk warm from the cow.

The temperature of the water for cooling presented great difficulties in many districts. On some farms this spring, when the greatest care was taken in cooling the milk, the temperature could not be reduced below 58°, 59°, or even 60°.

General Conclusions.

On many farms that I visited at the beginning of the competition I found the conditions under which the milk was produced were exceedingly poor. But changes were soon made, and it is a very great credit to the farmers and their men that when I visited them a second time I usually found that enormous improvements had taken place. At my first surprise visit a certain herd obtained 257 marks, and the sample of milk that I took contained 11,300,000 bacteria per c.c., with coli in 1/1000. At my second visit 471 marks were scored, while the sample of milk contained only 3,700 bacteria per c.c., and no coli.

I would like to take this opportunity of thanking the competitors whom I have had the pleasure of meeting during my inspections for this competition. Every facility was given me to carry out a thorough inspection of the methods employed, which made my work most enjoyable.

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REPORT ON THE BACTERIAL EXAMINATIONS.

By F. Procter, B.A., Cambridge Dip. in Animal Husbandry.

1. Notes on the Bacteriology of the Samples.

In this competition there were 53 competitors. Six samples of morning milk were sent by each competitor for examination, and in most cases two surprise samples of the evening's milk were taken. With each sample came particulars of the sampling, and on arrival at the laboratory the samples were arranged and tested according to the time of sampling. This system worked so well that the cultures from the milk were made when the milk was between 28 and 29 hours old.

For the bacterial counts standard agar was used, while litmus lactose peptone water was used for the detection of manurial organisms; no tests for manurial bacteria (coliform bacteria) were carried out for less quantities than 1/1000 of a c.c. of milk. (Note—The abbreviation c.c. means "cubic centimetre," which is equivalent to about 18 drops.) Each dairy was given an index number from 1 to 53. The milk samples were, on the whole, very good. the counts being satisfactorily low, and in most cases the bacteria and coli were less numerous in the last samples than in the first samples, and the keeping properties increased as the competition progressed.

Only two samples from the Wye College Farm (Herd No. 2) gave counts of more than 1,000 bacteria per c.c., and only three samples from Captain Hatfeild's dairy (Herd No. 8) gave counts of over 1,000; Captain Hatfeild secured the lowest count of all—140 bacteria per c.c., which is very creditable in milk 28 hours old. Four samples of milk from the winning herd did not become tainted for four days.

The tests for bacteria and coli having been made, the residual milk was placed in an incubator maintained at 60° F. (constant room temperature) and tested night and morning to detect any taints. Two marks were given from the time of milking for each half-day the sample remained sweet, and the life of the milk was held to have ended when a taint appeared; if the sample went off quickly, and was eventually "condemned" on tasting instead of being merely "tainted," then one mark was deducted from the score. The keeping properties became better and better as the Competition progressed; four days sweet was the longest time recorded, and one day was the least.

During the course of the Competition several farmers started sterilising their dairy utensils by steam, and the results were astonishingly good. Most of the competitors now appear to have grasped the essential factors of clean-milk production; this statement is borne out both by Mr. Porter's latest inspections and by the laboratory results.

2. Coliform Organisms.

The exact number of Coliform Organisms present in the various samples of milk submitted was not determined in this Competition. Attention was confined to ascertaining whether these organisms were present or absent in a cubic centimetre (1 c.c.), or fractions of a cubic centimetre of milk.

It takes nearly 28½ cubic centimetres of water to weigh one ounce, so that 1 c.c. is a small volume and 1/1000 c.c. is an exceedingly small quantity. We did not examine for the presence of Coliform Organisms in smaller quantities than 1/000 c.c. of milk, but spasmodic tests showed that these bacteria could be detected even in 1/100,000 c.c. of some samples of milk that were sent in by competitors. A sample of milk that contains Coliform Organisms in so small a quantity as 1/000 c.c. may be considered to contain many of these objectionable bacteria, but a sample in which Coli can only be detected in 1 c.c. or 1/10 c.c. is relatively quite good. Some of the competitors were under the impression, early in the Competition, that Coliform Organisms present in 1/1000 c.c. indicated the best milk and Coliform Organisms present in 1 c.c. was the worst milk; exactly the reverse is the case.

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3. Keeping Properties of the Milk.

Many of the milk samples that came in towards the end of the Competition had a much longer " life " than the samples submitted in the early days. This is indicated by the higher marks that some competitors obtained for " Keeping Properties." The following graph shows how the average samples of milk in each round improved consistently in Keeping Properties as the Competition proceeded :—

The Keeping Property of a sample of milk does not necessarily vary with the number of bacteria present, as the following figures, obtained in the Third Round show :—

Herd No.	Bacterial Count per c.c.	Coliform Organisms present in.	Points given for keeping properties.
8	360	Absent	12
44	8.800	Absent	13
24	132,000	1/100 c.c.	10
39	61,000	1/100 c.c.	6
19	3,640,000	1/1000 c.c.	6
20	54,000	1/1000 c.c.	6

The " life " of the milk, i.e., the length of time it will remain sweet, is not proportional to the total number of bacteria nor to the number of Coliform Organisms it contains; the controlling factor is the **types of bacteria** present. Some kinds taint or clot the milk much more readily than others. The points allowed for keeping properties give therefore little indication of the number or proportion of detrimental bacteria present. In testing for Keeping Properties the milk samples are kept in an incubator at a temperature of 60° F., and at this temperature bacteria multiply with remarkable rapidity after the milk is about one day old.

4. The Cleansing of Utensils.

On visiting several of the competitors it was seen that some of them were not adopting the best methods of washing the dairy utensils. A frequent fault is to start the cleaning process by scalding the pails and the cooler. The effect of this is to coagulate or solidify the albumen of the adhering milk, just as a " skin " forms over milk heated in a saucepan or cup. When the milk has solidified in this way on the sides of the utensil it is exceedingly difficult to remove it afterwards. It is therefore **a serious mistake to start off by scalding with hot water or steam.**

When washing, the first thing to do is to remove all traces of milk with cold water immediately after use; the utensils may then be left for a time if necessary so that the staff may have breakfast. On resuming, all vessels should be well washed and scrubbed in hot water containing washing soda to remove the grease and fat; it is then necessary to get rid of the last traces of washing soda, and this is done by rinsing with cold water.

After the utensils have been washed with hot water and soda there are no milk residues and no greasy material remaining to supply food to bacteria, but countless organisms are still clinging to the walls of the churns and pails. Sterilisation is the only way of destroying these, but it must be borne in mind that sterilisation does not replace careful washing, and that good washing is not sufficient without sterilisation; the one is complementary to the other, and a thoroughly washed, sterilised and dry utensil is the object to aim at.

Steam is the most effective sterilising agent that can be employed on the farm; it is simple to use, and it dries the utensils so that bacteria are unable to multiply. If a steam engine or pressure boiler is on the farm steam may be directed into a tank which contains all the small utensils, and to a jet to sterilise the churns. All articles that touch the milk should be steamed, such as the cooler, strainer, pails, measures, churn lids, churns, taps, and cloths used for straining the milk or washing the udders, otherwise they soon become a hotbed of bacteria. An illustration of this was an actual case which occurred in this Competition, where milk containing 36,300 bacteria per c.c. and Coli in 1/1000 c.c., after passing through an unsteamed tap containing a little curdy material, afterwards gave a count of 4,200 000 bacteria per c.c. and Coli in 1/10,000 c.c. The sample of milk that had passed through the tap was not taken until four or five gallons had previously passed through, and it kept sweet 1$\frac{3}{4}$ days compared with two days in the case of the other sample.

The farm inspections showed that a dirty cooler or straining cloths were responsible for much of the lower-grade milk at the commencement of the Competition, but second visits usually showed that radical improvements had taken place. This coincided with the longer-keeping properties of the milk that was examined in the laboratory. To produce milk of low bacterial count it is essential that all vessels with which the milk comes in contact be clean and in good condition. Rusty surfaces and seams are difficult to clean and are excellent shelters for bacteria, and old vessels should be regarded with great suspicion.

The Cooler is perhaps the most difficult article—excepting the milking machine—to keep clean. Competitors are advised to scrutinise very carefully all the corners, flanges and corrugations and to see that no dried milk nor curdy material is present. This is a very frequent source of contamination of milk that otherwise has been produced under good conditions.

5. An Improvised Sterilising Plant.

Many farmers say they cannot sterilise by steam because they have no "steam under pressure." This is not necessary. If an ordinary copper or portable boiler is used on the farm, this may be employed quite satisfactorily. A wooden lid should be made to cover the cauldron and in the centre of this a metal pipe six or eight inches in length and two inches in diameter should be fixed to lead the steam from the boiler into the article to be sterilised. Churns and pails can thus be effectively steamed at little expense. When they have been done, the churn lids, cooler, strainers, measures and cloths can be heaped on the wooden lid and covered by a box (preferably of metal) and so sterilised. This method of sterilising fits in well with the washing up, and soon after the mouth of the inverted churn or bucket is unbearably hot to the fingers it may be removed and a fresh one put over the steam pipe.

The following is a description of an improvised Sterilising Plant set up in a hurry on the Wye College Farm, which greatly assisted this herd in securing second place in the Competition. The want of a steriliser was only realised shortly before the Competition began, and as expenditure had to be kept down as low as possible, the bailiff looked around for anything that could be used. He set up an old portable boiler in an outhouse near the dairy, and placed a wooden lid on it bearing a pipe two inches wide which projected about four inches above the cover through the centre. This pipe served to lead the steam from the cauldron into the churns or whatever was being steamed.

To sterilise the cooler, strainer and other small articles, he made a heap of them on the cover and placed an old corn bin over them for at least half an hour (see photograph on page —). Usually these small articles were steamed last, and when sterilisation was completed they were left on the steamer until required for use at the next milking; being under the corn bin contamination was avoided.

From the time that sterilisation has been practiced on this farm Bacillus Coli has only been detected on one occasion. An endeavour was made, after the Competition was finished, to determine the efficiency of the apparatus. Two 17-gallon churns, that had long been discarded and were very rusty inside, were infected with stale milk and left for two days. Each churn was then washed and scrubbed with cold water and washing soda, well rinsed out with cold water, and one churn was sterilised on the portable copper. The churns were left on one side for twenty-four hours, when they were rinsed with 600 cubic centimetres of sterile water and the insides swabbed with sterilised mops to detach the bacteria from the walls of the churns and suspend them in the water. The washings were then removed to the laboratory and tested bacteriologically. Old churns were used because they are difficult to clean, and washing in hot water was purposely avoided so as to leave large numbers of bacteria in the churn—the object being not to test the washing but the sterilising; the conditions consequently did not favour the sterilising apparatus. The experiment was performed twice.

RESULTS OF THE FIRST EXPERIMENT :—

Two plates were made of the washings from the sterilised churn and gave counts of 53 and 60 bacteria per c.c. of the washings; no coliform organisms were present.

The washings from the washed churn, but unsterilised, gave a count of 2,120,000 bacteria per c.c. with Coli in 1/1,000,000 c.c.

RESULTS OF THE SECOND EXPERIMENT :—

The tests from the sterilised churn gave counts of 31 and 34 bacteria per c.c. and no Coli.

The washings from the washed churn, but unsterilised, gave 3,540,000 bacteria per c.c. and Coli in 1/100,000 c.c.

In each experiment milk with a low bacterial count was inoculated with the washings in the same proportion that would have obtained if the churns had been filled with milk, and the samples were kept to find out the keeping properties. In the first experiment the "washed" milk kept sweet half a day, whereas the milk infected with washings from the steamed churn kept sweet for three days; the clean milk used kept sweet for three days.

WILLIAM JOHNSON. Junr.,

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In the second experiment the "washed" milk remained sweet half a day, the milk with the washings from the sterilised churn three and a-half days, and the control milk three and a-half days. The milk samples were incubated at 60° F. (i.e., average room temperature). These results are tabulated below :—

TABLE COMPARING THE RESULTS OBTAINED BY STEAMING AND WASHING CHURNS.

	Bacterial Count per c.c. of the washings.	B. Coli present in	Keeping Properties of the inoculated milk samples.
Washed churn ...	2,120,000	1/1,000,000 c.c.	½ day.
Steamed churn ...	(1) 53	Absent	3 days.
	(2) 60	—	3 days.
Control milk	—	—	3 days.
Washed churn ...	3,540,000	1/100,000 c.c.	½ day.
Steamed churn ...	(1) 31	Absent	3½ days.
	(2) 34	—	3½ days.
Control milk	—	—	3½ days.

The apparatus was therefore quite efficient; the drawbacks to it are that—

(1) Much more heat is lost from the firebox and cauldron than from a bricked-up boiler, consequently considerable time is lost in getting up sufficient steam.

(2) The sterilising takes longer than if steam is admitted from a pressure boiler into a "steaming tank" which will hold all the utensils at the same time.

The obvious advantage is the small outlay required to set up a farm "copper" boiler if one is not already in existence.

These experiments show clearly that steam under pressure is not necessary for the sterilisation of the utensils, and that good results can be obtained with primitive apparatus.

The photograph shows the portable boiler in use as a sterilising appliance, with the corn bin slightly raised up to show the cooler being steamed. In front of the cooler can be seen the pipe that leads the steam to the utensils. Near the cooler is a covered milking pail which is steamed by merely inverting it over the jet and leaving it for a minute after the flange round the opening (which is now at the bottom) becomes unbearably hot to the fingers. This type of steriliser gives excellent results when the steam at the jet has a temperature of 210° F.

The following figures from the Wye College cows are also interesting :—

Before a sterilising plant was installed, before the udders were clipped and before covered milking pails were used, although the udders were washed and all other ordinary precautions taken—

Bacterial Count, 70,000 Bacteria per c.c.
Coliform Organisms found in, 1/100 c.c.

After the home-made sterilising plant was installed and udders had been clipped—

Bacterial Count, 620 Bacteria per c.c.
No Coliform Organisms found.

The results of another experiment with the same herd of cows were as follows :—

Udders clipped, open milking pails used, 6,300 Bacteria per c.c.
Udders clipped, covered milking pails used, 350 Bacteria per c.c.

In each case all the utensils had been thoroughly sterilised.

6. **Some Economic Aspects of Clean Milk Production.**

All milk ought to be clean. Most people are very particular about the water they drink, but it must be admitted that if drinking water contained as much manurial contamination as milk sometimes does, it would be condemned as unfit and dangerous to the public health.

Dirty milk does not keep sweet long; clean milk being comparatively free from bacteria has a much longer life, thus creating more confidence in everyone who handles it. This is very important because the dealers do not want to buy milk that may sour when they get it, nor will the housewife buy more than the bare minimum when there is a danger of it souring owing to hot-weather conditions.

Some people argue that milk in summer ought to be transported in iced railway vans; others would like to see almost all milk pasteurised. Why? We read that such a procedure is practised in the United States of America, but surely that is no reason why the same should be done here. In America a continental climate prevails, and it may be necessary to used iced vans where extremely hot summers are the rule. In Great Britain pasteurisation is practised by the trade to make their milk keep good a reasonable time, but if milk of low bacterial content were produced, neither iced railway facilities nor pasteurisation would probably be required. The writer realises that at the present time pasteurisation may be the only way of dealing with much milk that is supplied to the trade, but this is to be regretted, as the effects of such a method are deleterious to the consumers. The changes that pasteurisation causes in milk are probably far-reaching, but insidious in action. In New York, where 98 per cent. of the entire milk supply is pasteurised, a considerable number of young children have scurvy—obvious or latent; this is because certain nutrient principles of the food have been destroyed and fresh unpasteurised milk would prevent this.

It is often argued that if people eat a variety of foods they will not suffer because of insufficiency of those accessory food factors known as vitamins. Professor Drummond has pointed out, however, that our food may be much nearer the danger limit than many of us imagine; in a paper read to the Royal Society of Arts on April 25th, 1923, entitled "Changes in the Digestibility and Nutritive Value of Milk Induced by Heating," Dr. Drummond stated: "In discussing the vitamins . . . and their significance in the nutrition of the masses, one frequently encounters the argument that the food consumed in Western Europe is of so varied a character that deficiences in one component, occurring either naturally or caused by artificial treatments, tend to be made good by the supplies contained in another constituent of the ration. No more dangerous belief could be held, and if the tragic story of the peoples of the Central Powers is not sufficient to demonstrate this, a single example taken nearer home may serve. During the war the populations of many of our larger northern towns were, as industrial workers, being as well fed as any people in the country, and, although probably restricted in some directions, were able to obtain a diet quantitatively sufficient and reasonably varied. In spite of this, the incidence of several sharp outbreaks of typical scurvy when the potato crop failed demonstrated that here were cases of large masses of individuals living on a varied diet but, nevertheless, in the borderland of one of the severe deficiency diseases It is unfortunately only too easy to introduce one modification of the food after another without appreciating how far along the path towards a wholly artificial food supply we have already progressed, or how slight may be the change which just turns the balance."

Modern civilisation entails so much preserving and cooking of food to keep it hygienically sound that we are not so safe from illnesses of mal-nutrition as some people think. Let us hope therefore that pasteurisation may be only a temporary measure, and that it may soon be possible to sell safely raw milk to the multitude, and that the money expended on pasteurisation may be paid to the farmer to help him to produce high-class milk. Compulsory pasteurisation would also be the death-blow of the producer-retailer.

Clean-milk production is sure to help farmers to get a good summer price; if gluts of milk continue to occur, and to increase, then only those that produce good milk can be sure of selling at an economically sound price. Clean milk, then, appears to offer a solution of the iced milk-van demand, of pasteurisation, and of selling milk at times of over production; a further consideration is that the public would gain confidence and feel prepared to buy more—being assured of good-keeping properties.

This Competition has shown that palatial buildings and expensive equipment are not necessary for the production of good, clean milk. Success in clean-milk production is primarily due to the following factors:—

(1) Careful personal supervision by the master.
(2) Working to system and careful attention to details.
(3) Cleanliness and clipping of udders and flanks, and clean cowsheds, milking stools and milkers.
(4) The provision of covered milking pails.
(5) A supply of steam and careful sterilisation of all utensils that touch the milk.

Some competitors are contemplating applying for licenses as producers of Grade A or Certified milk. Such competitors should remember that the milk samples reported upon in this Competition were tested when the milk was 28 to 29 hours old. In the case of farmers who are licensed to produce Certified or Grade A milk as defined in the "Milk—Special Designations Order," official samples are taken and examined bacteriologically **as delivered to the consumer.** It must also be borne in mind that many of the herds that have been reported upon as having produced milk of Certified or Grade A standard have not been successful in reaching such a high standard in every round. No farmer would be justified in applying for a license as a Certified or Grade A Milk Producer unless he could depend on producing milk of the necessary standard regularly day by day. Further, it must be remembered that if Grade A milk is

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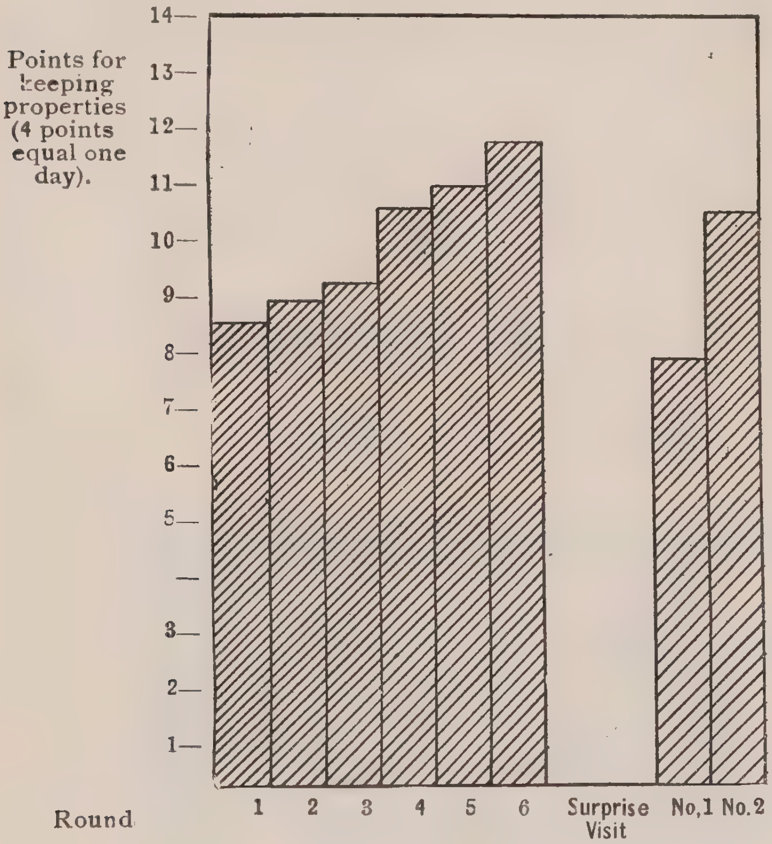
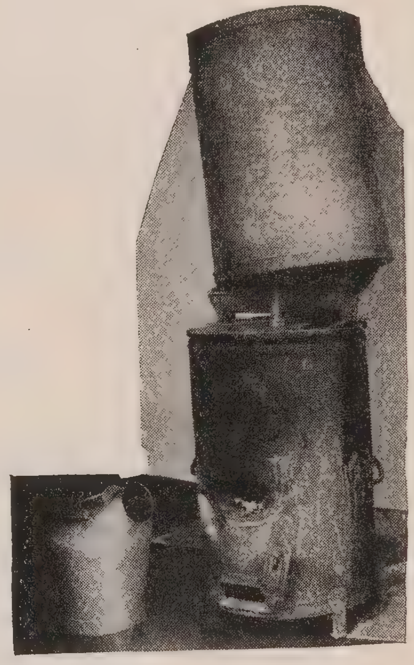
produced, the retailer must put it into bottles before selling it. A considerable margin of safety should be allowed by the farmer if the milk retailer is to come within the regulations, and the milk, as sold to the consumer in bottles, is still to contain less than 200,000 bacteria per c.c. and no Bacillus Coli in 1/100 c.c. To be on the safe side, Grade A milk in churns as it leaves the farm for a railway journey should not exceed 5,000 or 6,000 bacteria per c.c. and no Bacilli Coli should be present in 1 c.c. Furthermore, cows that react to the Tuberculin Test may not be used for the production of Certified or Grade A (Tuberculin-tested) milk. For the production of Grade A (Veterinary-tested)milk the cows are not tuberculin-tested, but it is required in the regulations that a clinical inspection of the cows shall be made periodically by a competent veterinary surgeon.





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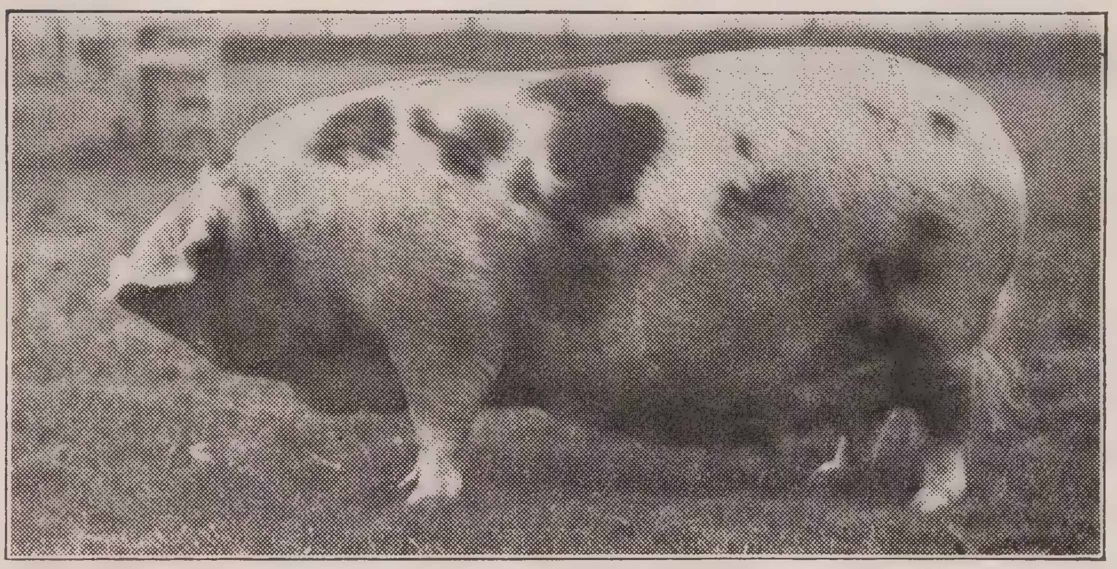

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HOW I PRODUCE CLEAN MILK.

By Captain A. C. HATFEILD, Winner of the Challenge Cup.

It is obviously the duty of every dairy farmer to turn his milk out as clean and free from contamination as he reasonably can. Does, however, the purchaser of his milk, whether the wholesaler, the retailer, or the consumer, differentiate between milk which is clean and that which is not? In the case of any other article of food it is perfectly well recognised that there are several different qualities of that article sold, and the price varies according to the quality.

Now, what is the essential for the production of clean milk? Some people will tell you that the first essential is that you must have the latest modern cowsheds with expensive fittings, etc., built with special regard to sanitation, ventilation, cubic air space per cow, etc., etc.

There are two cowsheds on this farm, one of which forms part of an old barn at least 150 years old. It was an old stable. The floor is of brick, very old and in places badly worn, there is no window in this cowshed at all, but it has a door at each end and a few ventilation holes in the wall. No labour except that on the farm was employed to convert this into a cowshed, and nothing was purchased except zinc sheeting for relining the old wooden mangers. There is no gutter at all, but the floor shows some slight inclination to drain to a hole under the door sill at one end, where there is a drain outside to receive it. The other building is about 100 years old, it has a good floor, but little or no gutter, the partitions are wood and the mangers are of cement, which is difficult to keep clean. It was improved last year by taking in an old meal store which separated two small cowsheds by a brick partition, and was under the same roof; the floor of this was concreted and brought up to conform to the level of the rest. The same type of mangers were put in, also an extra window to satisfy the sanitary inspector. In no way can either of these buildings be said to be modern, neither have they expensive fittings.

Now I have no wish to under-estimate the usefulness of modern cowsheds, built on the latest hygienic principles. If I were building a new cowshed, I should certainly try to get it built to conform to those principles; but they are in my opinion in no way **essential** in the production of clean milk, though they simplify it.

The second thing some people will tell you is essential is a separate building with concrete walls, etc., whence the milk should be removed after milking each cow and put through the cooler. I am afraid I must confess that I have no such building and therefore cool the milk in the cowshed.

The local authorities were good enough a year ago to overlook this practice until such a time as another building should be erected. When they came early in May to see if the cowsheds had been limewashed I believe they were somewhat upset to find that the milk was still being cooled in the cowshed, in spite of the fact that we were competing in the Clean Milk Competition. I think they wished us well in the Competition, but felt that since we had totally disregarded Rule No. 2 there was no earthly hope for us in any competition.

Now I am not recommending cooling milk in a cowshed, and hope some day to have a proper place to cool it in, but this separate building is not essential to the production of clean milk, and if a farmer has not got such a place I believe he can still produce clean milk without it, provided that he keeps the cowshed spotlessly clean.

What then is essential if a farmer wishes to produce clean milk? The first thing a farmer must do is to learn **himself** exactly how this can be done. This is perfectly simple, as many excellent articles have been written on this subject; in fact, the advice and instructions given to the farmers who entered for this clean milk competition, if carefully studied, were quite sufficient for this purpose. The article written by Capt. Skelton in the Essex Farmers' Union Year-Book also gives very sound advice.

The second essential is that the farmer must get his cowmen to take an interest in clean-milk production. Nothing in my opinion will help to do this more than competitions. The average cowman will possibly not at first take kindly to studying the habits of bacteria, Coliform organisms, etc. If he believes in their existence at all, he probably has some hazy idea that such things are in the nature of a flea or bug, but too small to be caught between the thumb and fingers, and will probably reason in his mind that if these bugs get in the milk they don't do any harm, but if the milk is to be kept free of them, this will easily be accomplished by pouring the milk through as many pieces of straining cloth as he can possibly lay his hands on. Any cowman, however, who is of any use at all will take great interest in a competition, if only to try and do better than the cowman on the next farm.

The men on this farm took the greatest interest in the Competition from the start. They read the conditions and method which would be adopted in scoring and pointed out to me that they were going to lose 16 points on the inspection because the milk was cooled in the cowsheds. I naturally wished to encourage them in every way I could, but did not wish to go to the expense of building a cooling room. I told them 16 points out of a possible 600 was not such a bad handicap, but as we had no cooling room we would have a "steaming apparatus" for the churns, etc., and hope to score 16 points on that as it did not seem likely that many farms would have one.

This was promptly made by the farm bailiff according to an idea I had seen at the Dairy Show about a year previously. It consisted of a small portable "Any type" copper which had previously been used for boiling "chat" potatoes for pigs and had been bought at a farm sale for about 25s. It was not then in use, as there were no pigs on the farm. It stood in a small copper-house, next to a large copper from which the water was used for washing up the dairy utensils. The "steamer" consisted of making out of some boards on the farm a tight-fitting lid. In the centre of this lid a hole was bored about 1½ inches in diameter and a 9-inch piece of water-pipe was fitted tight into the hole. Three lengths of stove piping were purchased to connect up to the brick chimney of the large copper. The whole thing was thoroughly cleaned, the iron work blackleaded and the steamer was complete.

I must confess that neither the bailiff nor myself thought that it was going to be of much practical use. However, we put a bucket of water in it, lit the fire and put the lid on. After about five minutes a fair jet of steam appeared to come through the pipe, so a churn was inverted over the pipe, leaving it resting on the lid for about three minutes. When we came to take the churn off we found it so hot one could not handle it. I am convinced that this really makes a quite efficient "steamer" and was to a great extent responsible for the improvement in the bacterial count of the latter samples of our milk.

Now with regard to the methods employed on this farm. There was nothing remarkable about them at all. Two pairs of white overalls were purchased for each man, to be used when actually milking. The greatest care from the commencement was taken in the cleanliness of the cowsheds, utensils and personal cleanliness of the milkers, and yet the first sample of milk sent up was not good; in fact, I think there were about 20 competitors who produced better samples in the first round. This was chiefly due, I think, to a common error, that of brushing the cows with a "dandy brush" just before milking, and thereby causing dust in the cowsheds. Before the second sample was taken we had tried to improve by washing the cows' udders instead of brushing them, and two domed-top milk pails had been purchased. These milk pails had a very small opening, and were at first disliked by the men. After about a month, when they had got used to them, they had no difficulty with them at all, and actually preferred them to the ordinary type of open pail.

The greatly improved results of the second sample encouraged the men, as they saw some definite result of their efforts and were determined to improve more if possible. A pair of clippers was purchased and the long hairs on the cows' udders, having previously been trimmed with scissors, were clipped, also the tails, with the exception of the "switch." This with the fact that plenty of wheat straw was used for litter made it easier to keep the cows clean.

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The method finally adopted, which was the most satisfactory, was as follows :—

1. The feed was put in the cow's mangers (this consisted, besides the cake ration, of chopped oat straw, hay, and pulped wurtzel).

2. The manure was moved back to about three feet behind each cow.

3. The udders of the cows, also flanks and tails, were washed with a sponge and a bucket of tepid water, in which was put a few drops of Lysol disinfectant, the water being changed when necessary. After each cow had been washed down she was dried with a rough towel.

4. The cow sheds were sprayed with an ordinary garden syringe (using the finest sprayer) with a bucket of water in which had been put about an egg cup of disinfectant. Some of this was sprayed on the litter and also poured down the mouth of the drain outside the cow shed.

5. The cooler, milking pails, weighing pail, churn and strainer, which had been washed overnight, and steamed over the small " steamer " were brought into the cow shed.

6. The men put on their white coats and washed their hands in a pail of water. They rinsed their hands in this after milking each cow.

7. When a cow was milked, the milk was weighed in the weighing bucket and emptied into the container, which had a clean piece of muslin over it. The water was turned on, the tap of the container opened slightly, the milk running slowly down the cooler through a funnel with metal and cotton disc strainer into the churn. These disc " cotton wool " strainers can be bought cheaply and thrown away after once being used.

8. The cooler, etc., was rinsed with cold water, the milk removed from the cow shed, and the men went to breakfast.

After the men returned from breakfast the cows were turned out in the yard, where they could obtain water and long oat straw. This yard was kept well littered up, so that the cows kept themselves clean. The manure was removed from the cow shed and loaded up on an old cart kept for that purpose. This was removed daily.

The remaining litter was pushed up to the front of the stalls and the shed thoroughly washed out, using plenty of water and a broom. Some more wheat straw was brought in and the sheds were ready for the cows, which unless the weather was very cold did not come in again till 3 p.m.

The utensils were washed with hot water and soda, and afterwards rinsed with cold water, the steaming being done not more than once a day. They were then stood upside down on a wooden table outside the copper house to drain and afterwards removed to the dairy.

Success was due entirely to the great interest the men took in the competition and the thoroughness with which they did their work. Unless a man can see the reason for doing a certain thing he will probably consider it unnecessary, and sooner or later will only half do it. Explain exactly to the men why you want them to do any special thing that has not been done on your farm before, and see that you provide them with the few things that are necessary, to enable them to do it properly. For instance, it is useless expecting your cowman to wash the cows' udders properly, when he has nothing but a dirty piece of rag or an old bran bag to do it with.

In conclusion I would say to the consumer, you can greatly assist in ensuring your milk being clean and pure :—

1. By seeing that the receptacles into which you put your milk are thoroughly clean.

2. By keeping your milk after receiving it in a cool place free from contamination by flies, etc.

3. If you keep the milk in your milkman's bottles, cans or churns, wash them out as soon as possible. When the dregs have dried on the sides of the bottles or churns, they quickly go sour, especially in a warm place, and are then much more difficult to effectually sterilise.

Hartsdown Farm, Margate, June, 1923.

CARE OF MILK IN THE HOME.

CONSTANT PONDER, M.D., Assistant County Medical Officer, Kent.

Milk on its journey from the cow to the human baby's bottle usually has to go through a complicated itinerary, at any stage of which, contamination may occur. For example, in the process of milking, from the hands of the milker or from dirt on the cow; in the cooling process from dirty utensils, or dust falling in; in the churns as it passes by road and rail, from similar causes; and finally in the retailer's shop or in the home, through being placed in dirty utensils or from dust falling in or from flies gaining access to it.

It is quite possible that in the last stage of its journey its most dangerous contamination may take place, for it is perhaps then that flies which are carrying disease germs are most likely to gain access to it. The farmer, by allowing his cows to be milked in a dirty state, may produce a milk which is full of bacteria (germs or microbes), but as far as is known at present there is no special danger attached to the presence of such bacteria if they arise from the ordinary dirt to be found on a farm. They may *possibly* cause disease in human beings, and it is desirable that their numbers should be kept down, both on account of this possibility and because milk with high bacterial content has not got good keeping properties; but there is no evidence that disease is directly caused in this way. Needless to say, there is no excuse for the farmer who neglects to make reasonably sure that his cows are not free from tuberculosis, and that his milk does not therefore contain the bacteria causing consumption, but that is a different problem because the milk is infected before it leaves the cow.

In order that milk may convey disease (apart from tuberculosis), it is necessary that there should be some more or less direct link between the milk and a patient suffering from the disease. For example, a milker who has suffered from typhoid fever may carry the bacteria of this disease in his system long after he has been convalescent, and may convey such bacteria to the milk, where, by increasing in numbers, they may cause the disease in anyone who drinks the milk. Or, again, a milkman delivering milk may have the bacteria of diphtheria in his throat, though not himself suffering from the disease, and by coughing near the exposed surface of the milk he may introduce these germs and so cause disease in children who drink it.

The commonest disease almost certainly caused by milk is the infantile diarrhœa which attacks babies in hot weather, and there is a great deal of evidence to show that the milk becomes infected in crowded centres of population, either in the retailer's shop or the home, by flies. Milk is unfortunately a perfect food and breeding ground for all kinds of bacteria, especially in warm weather, consequently if a few disease-producing bacteria are introduced, for example, by a fly feeding on it, such bacteria will multiply until there may be more than sufficient to reproduce the disease in anyone who drinks it. Therefore, the care of milk resolves itself into allowing as few bacteria as possible to get into the milk at any stage, and in always keeping the milk at as low a temperature as possible, so that those bacteria that are unavoidably present will not multiply too rapidly.

In the ordinary English home there is not usually much provision for taking care of milk. Unfortunately it is not common to find an ice chest provided, for example. But a great deal can be done by paying attention to details, in order that this food, which is the most valuable we possess, should be consumed in as clean a condition as possible.

Milk should always be put in scrupulously clean vessels: a jug which has held milk previously should be rinsed out first in cold water and then washed in hot water and soda, and for a baby's milk it should certainly be finally scalded with boiling water and placed upside down without drying on a rack to drain.

It should be kept in the coolest place available, whether this be a cellar or an open air larder in the shade with breeze passing through or merely in the larder of a house on the north side.

Access of dust should be avoided chiefly by ensuring that the house is as free from dust as scrupulous cleanliness can make it.

The precautions which we have so far been considering have been chiefly concerned in guarding against the souring of milk. Care is also needed to prevent the access of disease germs, and, as has been already stated, it is probable that the common house fly is the most frequent agent by which this occurs.

The normal ways of the common house fly are repulsive and dangerous. It is bred in filth and feeds on filth, but also unfortunately feeds on human food, such as milk. As a result, its hairy feet and legs become coated with bacteria, which it conveys from the privy midden to the milk jug, or from the soiled napkin to the baby's battle. Moreover, a fly, in order to dissolve a food material which is too solid to draw up through his trunk, will regurgitate the last meal from his crop in order to soften it. Such material and excrement, both of which can be seen as brown spots where flies have frequented, are swarming in bacteria, and must be fruitful sources of disease if introduced into human food.

A consideration of these facts should surely lead to a war of extermination on these unpleasant insects. By concerted effort flies could be entirely abolished, as their habits are well known, and there are no insurmountable difficulties connected with preventing their breeding entirely, just as mosquitoes have been eliminated from certain tropical areas. Public opinion, however, will have to be considerably educated before the time is ripe for this effort. Meanwhile, however, a great deal can be done in the home to mitigate the fly nuisance. The numbers should be kept down as far as possible by ensuring that there are no breeding grounds in the neighbourhood, such as collections of house refuse which are allowed to remain for more than a week, or collections of horse manure, which are especially favoured by flies.

Flies hate draughts, and consequently may be discouraged from remaining in rooms by thorough ventilation. Attention should be given to all sanitary arrangements of the home so that flies may not have access to infective materials. As many flies as possible should be destroyed by fly papers, balloon traps, or other methods. A good method of protecting milk in jugs or food in other vessels is to make net covers in the following way: Take some of the white material known as "mosquito netting" and cut out circular pieces of different sizes which will be large enough to cover the mouths of the different jugs or basins and at the same time hang over the edge to the extent of about two inches all round. To the edge of these circular pieces of netting, glass beads should be sewn. If small beads about the size of a pea are used they should be sewn on fairly closely all round: if larger they can be sewn on at greater intervals. When the net is placed over the mouth of the jug or basin, the weight of the beads will tighten the net over any irregularity of the edge, such as a spout, and thus make it impossible for flies to creep underneath and get at the food.

Clean fresh milk is the very best form of food known: it is worth while taking every kind of care to ensure that it remains uncontaminated, and it should not be necessary to submit it to heating processes (condensing, pasteurisation, production of milk powders, etc.), which though apparently a safeguard from the bacterial point of view, must result in a fundamental change in the natural character of the milk, the influence of which on the health of the future generation is unknown.

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Preliminary Entry Form.

TO DAIRY FARMERS.

CLEAN MILK IN KENT COMPETITION, 1924.

We are endeavouring to make arrangements for a Clean Milk Competition to take place in 1924, commencing January 1st, or earlier if possible.

The tremendous success of the Competition held in 1923 may mean that it will be necessary to restrict the number of entries, owing to the huge amount of work involved; you are therefore advised to fill in this form at the earliest moment and post it to :—

MR. PERCY WATSON,
Secretary, The Kent Milk Recording Society,
22, High Street, Maidstone.

All entry forms will be dealt with in strict rotation.

The Competition will be open to ALL DAIRY FARMERS IN KENT.

To The Kent Education Committee, in conjunction with The Kent Milk Recording Society.

Please enter my name for The Kent Clean Milk Competition, 1924, subject to you being able to make the necessary arrangements. I agree to pay the necessary entry fee (*same not to exceed £2 2s.), when called upon.

My herd at present consists of .... cows.

Signed ....

Address ....

....

Dated ....

* The entry fee has not yet been fixed, but it will be kept as low as possible.

For Office use.

Date received ....

Date acknowledged ....

Register Folio ....

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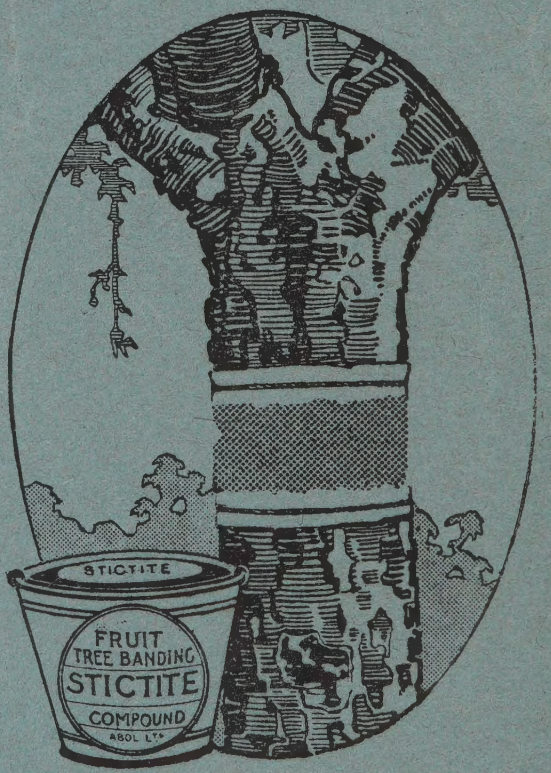

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